

**COOP'S
SATELLITE
DIGEST**



SEPTEMBER 1982

We'll pay to find out

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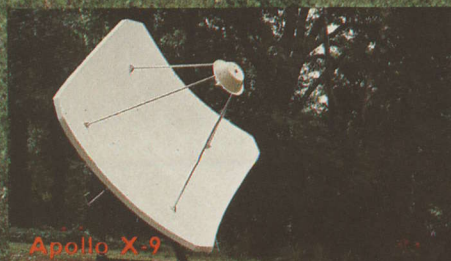
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While most major sporting events and movies can be received on Apollo systems, National Microtech cannot sell or transfer the viewing rights.



Apollo X-10



Apollo X-9



Amplica R-10 Tuner



Microdesign Receiver



Apollo Z-1 Tuner

TOP OF THE MONTH

12 GHz. With US FCC approval of 12 GHz DBS service for the United States, the field is off and running. However, DBS in one form or another has been in the advanced planning stages for several years now, in both the USA and Canada and Europe; and Canada will be the first to have it, shortly after the start of 1983.

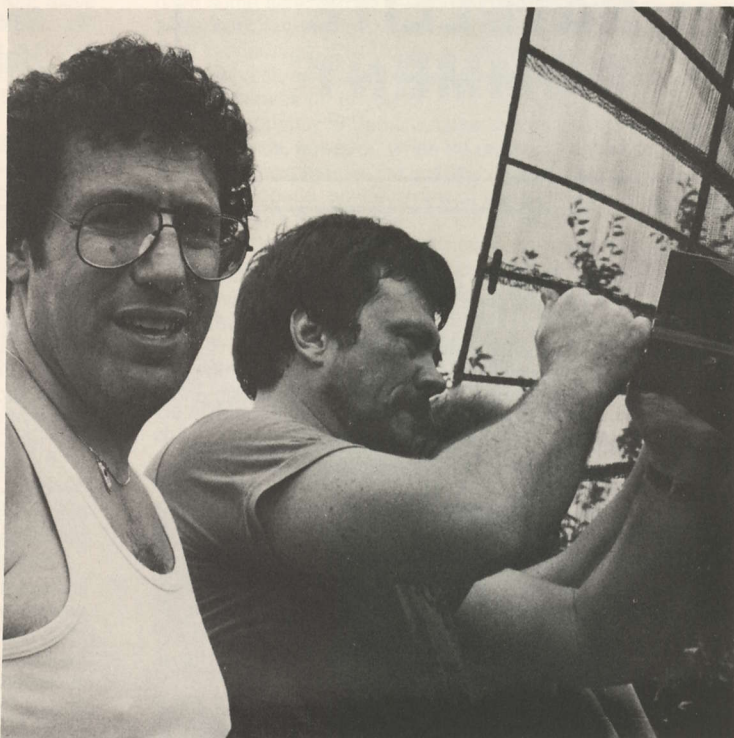
We have asked Steve Birkill to give us a detailed look at the state of 12 GHz politics and technology (the two are independent) in Europe in this issue. Why? Well, certainly satellite TV is worldwide. But more important, because Europe will not ever have much interest in 4 GHz technology, it will be at 12 where the first cross-pollination of worldwide low-cost TVRO technology takes place. And, Europe is further along in many areas of 12 GHz (DBS) than the USA (although certainly not as far along as Canada).

We have had an international 'lock' on 4 GHz low-cost technology largely because nobody really used 4 GHz for DBS but the North Americans. This is not to be at 12 GHz.

With the inroads of cable, MDS, STV and 4 GHz in North America, the 12 GHz (DBS) operations may take 5 to 10 years to get a strong foothold in **North America.** Not so in Europe, where none of the above exist in quantity, and where 12 GHz DBS will be the first 'outside program choice' offered to waiting millions (and millions). We will feel the 'explosion' in North America because Europe will use far more 12 GHz hardware on the ground than we will, this decade, and they will export it here far cheaper than we can produce it.

SEPTEMBER 1982

COOP'S COMMENT	page 2
12 GHz STATUS REPORT (S.J. Birkill)	page 4
OMAHA/Why and How	page 24

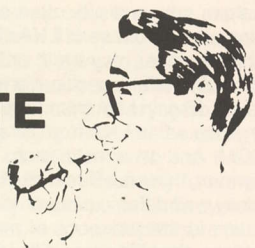


DAVID'S TVRO NOTES (David Barker)	page 28
KNOW WHERE YOUR ANTENNA IS (Lionel Fortier) ..	page 30
WHETTING AMERICA'S APPETITE (part two)	page 39
CORRESPONDENCE	page 46
BIRD OPERATIONAL NOTES (transponder watch)	page 48

OUR COVER —

Surfacing a new six meter dish at WIV-TV in Providenciales, Peter Stubbs moves methodically from hole to hole drilling sheet metal screw holes and then driving in screws. There are nearly 1000 screws in a 20 footer!

COOP'S SATELLITE DIGEST



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COOP'S SATELLITE COMMENT

- Equipment Pricing?
- Six Meter High Efficiency
- Habla Espanol?

PRICED TO SELL

You can always tell somebody who is new to the TVRO dealer game; they pour over the data sheets and fliers and **CSD** advertisements searching for a price on LNAs or antennas or receivers which is \$5 lower than they are now paying. There is nothing wrong with this of course; constant competition in this industry, certainly during the past 18 months or so, has been the major contributor to dramatic price break throughs.

It is apparent to me that the distributor to dealer two-step marketing approach is firmly entrenched in our industry. Frankly, that surprises me some since three years ago I thought it would go manufacturer to installing dealer; much like the cable hardware is distributed. I was wrong.

It is also apparent to me that the appearance of several, strong, national distributors in our industry has done more to push pricing down than any other factor we have encountered since the spring of 1980 or so. National Microtech started it all but Echosphere and JV and others too numerous to mention (except to soothe their ego!) have refined the art.

The distributor to dealer marketing approach has worked, is working, and will work in this industry because of the nature of being a dealer. The typical dealer is still stocking only a complete system or two; one to demo and one to have on hand for the buyer who won't sign the order form unless the system can be installed tonight. Most dealers have one or more distributors they work with, and they count on the distributor to be able to overnight ship system packages so the dealer can make his next installation. Some strange people are distributing goods; Jamie Gowen, of ADM, for example, handles receivers and LNAs so that those dealers who buy from him directly can get virtually everything they need at one spot. Most manufacturers 'dabble' in distribution as well; a receiver manufacturer handles LNAs and antennas, for example. Only the LNA manufacturers, which continues to be a 'high technology art', seem to be content to be pure manufacturers.

I suspect that the TVRO dealers may have some of the stiffest telephone bills in the country. They not only get on the horn to order hardware (I trust most of those orders are placed collect!), but they also call one or more of their distributors or direct-sell manufacturers for advice, and they constantly check for the best "\$5 off" price of today on LNAs, or other parts which are very competition-sensitive.

I am also discovering that the best prices are not always found in **CSD**, although we certainly carry a high amount of price-listed advertising. Because advertisers must have their advertising copy into us twenty days before publication, or more, and that works out to a month or more before you see it, and because prices drop with greater regularity than by-the-month, there are often ten to fifteen percent discounts that come along for limited periods of time that are not reflected in **CSD** advertising or fliers.

All of this is, in my view, healthy. And I wanted to make new dealers aware that while advertising-priced copy may be enticing and important in their buying decisions, they should also be aware that by staying in close contact with multiple distributors, they can best be assured of getting advantage of the latest, low-ball pricing.

All of this aside, a more relevant question may be just how important is pricing? LNAs in the three major brands are distributed widely.

They get shifted back and forth between distributors who trade stock to keep their balances in line, and with one possible exception, they are all pretty much alike. Receivers that are widely sold (such as the Drake) likewise bounce around from distributor to distributor; you may well get a unit that has been two or three places before it gets to you and has the carton opened for the first time. Antennas, of course, are either drop shipped to you from the manufacturer, or they come directly from manufacturer to distributor to you. Because of their bulk and weight, trans-shipping is simply not practical.

This suggests that pricing is really the one ingredient that separates products; as long as the products are of the same family. And, this fact should encourage the dealer to 'shop' on a purchase basis before he places each order.

However, there are other factors to consider. Perhaps the most important of these is dealer to distributor loyalty. When two or more people get involved in a 'deal', there are always potential conflicts. You, and I, simply cannot get along with 'some' people and when that happens, you elect to deal with somebody else, even if there are no price advantages to dealing elsewhere. After a new dealer bounces around between a couple of distributors, he usually finds one or two where he feels 'comfortable', and where the personalities mesh rather than grind. Having a distributor that is easy to get along with, and to whom you as a dealer can be loyal, is perhaps the one area that new dealers typically learn the hard way. Equipment, the equipment that you need for your installations, does not stay in constant supply. There are times every year when it does (or should) 'get tight'. If you have no strong dealer/distributor relationship, you may find yourself at the bottom of the 'order-fill' pile when equipment does get tight. A distributor is going to take care of his 'regular' customers when supplies get tight, and his occasional customers later; **if he has stock left over**. Think how upset you might be if you had a big sales week and found out you could not get any more LNAs or receivers or antennas (or all three), from anybody, for several weeks! You might even lose your retail sales to another dealer in your area who can get the stock.

As always, there is more to being a successful businessman than simply having a product people want at a price the buyer considers fair. If you overlook your important supplier relationship, you may find yourself out of the TVRO dealer business long before the winter doldrums set in!

LNA REMINDER

Dealers, new and old, often overlook what goes on inside of an LNA since the purchase of LNAs has recently boiled down to price. I think this reminder may be in order.

LNAs of similar specifications should be equal. That is, a 120 degree, 50 dB gain LNA from Amplica or Dexcel should be the same in performance as an LNA from Avantek, with the same specs, or from M/A COM. And on a test bench, this may well be the case.

However, there is at least one operational circumstance where the LNAs may well differ in picture results. Given that you are making an installation in the presence of medium to strong in-band terrestrial interference, the LNAs may differ slightly (LNA to LNA) in the way they handle the terrestrial signal levels. You can tell when an LNA is getting 'zapped' (as in overloaded) by an **in band** signal; you may seem to have reduced gain (washed out pictures), or you may have a bad case

of worms crawling through the picture. In band terrestrial interference is not difficult to diagnose; you can see or hear it wiping out one or more of the transponders in the TVRO band from the birds.

Out of band, microwave signals, are quite another matter. The typical LNA has the ability to amplify microwave signals **below** 3.7 GHz and **above** 4.2 GHz. Depending upon where you are located, you may have very strong, very deadly signals from (airport) radar, military links, or point to point terrestrial microwave outside of (but close enough to interfere in band) the 3.7 to 4.2 GHz band which can desensitize your LNA. What happens here is that the LNA is such a broadly tuned device with so much gain (50 dB plus) that even a signal 1 GHz removed (such as 2.8 GHz) can cause the LNA to change operational characteristics.

And this is where you will find that there are differences between brand name products. If you have had, are having, or expect to have some problems because an installation is nearby to a local, strong microwave source, you should talk with a distributor or LNA supplier about preparing for this situation. There is now a popular 3.7 to 4.2 GHz bandpass filter available to help out in a situation such as this, but the filter almost **MUST** go between the feed and the input to the LNA if it is going to stop the strong **out of band** signals from destroying the low noise and high gain characteristics of the LNA. And ahead of the LNA, the filter adds noise (because of filter loss) which the LNA cannot correct.

Practical experience tells us that if an LNA has 'poor image rejection' on the low frequency side (i.e. below 3.7 MHz), you can expect to run into installations where signals appearing locally, out of band (below 3.7 GHz), are going to cause you to have a less than satisfactory installation. Maybe the problem you are having is not the particular LNA you are working with, but the **brand** of LNA you have chosen. Here is one area where all brands are NOT created equal!

HIGH EFFICIENCY SIX METER?

One year ago we transported a Hero six meter 'Super Dish' to the Turks and Caicos island on Turks Air and spent two weeks putting it together. I wrote about the trials and tribulations of assembling an antenna which is very large, with hundreds of parts, and with no instruction manual. Several people commented that they thought the 'review' of the Super Tenna, for Hero, was quite negative.

I suspect it is difficult for some people to understand just how we function, with equipment reviews, so allow me to re-state the premises.

- 1) Some feel that my critiques, either in print or privately, are of some value so I get the opportunity to see a lot of equipment. I appreciate that since it allows me to do a better job of tracking 'trends' as well as specific product developments.
- 2) Any supplier can ship a unit to us for analysis and we'll either give them a private report, or, write about it in **CSD**. With some exceptions, we return the gear to them when it is for a private analysis and keep it around here for on-going use if it is for a **CSD** review. Hardware that gets into regular use is apt to be mentioned in print quite frequently, when it makes some sort of contribution to our on-going operation of WIV-TV, or general satellite system growth.

A product sent for review and on-going use gets a fair but hardly biased shake. I know that readers look for honest evaluations from us, and there is no way to maintain editorial integrity if we are glossing over product-problems in print.

And we acquire, like anyone else, products on the market, and having done so often write about them if they have some particular observations to make. The net result is that we do a fairly decent job of staying up with major products and virtually all of the product trends although we don't come close to evaluating **every** new box on the market; there are simply too many being released these days.

The Hero Communications six meter dish family has created an unusual amount of publicity for Bob Behar. Probably to the point of overkill. However, Bob has the ability to get his antenna systems into areas of the world where nobody has previously tested satellite reception, and when the first terminal shows up in Kuwait, or Saudi or Cameroon (etc.), and it works, how well it works and what it sees **is news**. At least one letter in five that we receive each month comes from somebody who wants to know what satellite TV service is like in

Madagascar or Bolivia or Fiji. And until we have the whole-earth 'plotted', based not upon some grand engineering projection but rather on actual field results, each time somebody (anybody) provides hard data on a new area, we **are** going to write about it in these pages.

As noted, Behar gets his dish systems into many unusual places, and when he reports on the results, that gets he and his antennas some additional publicity. I can understand readers figuring that we have some type of cozy relationship with Bob since he is in print so often; but, alas, that is not the case. That is one of the reasons I try so hard to encourage others to get out there and do testing, even if with a Luly umbrella antenna, so we have a wider selection of 'first time reports' to pass on to you.

The frequency of Behar's name in print does present an unusual problem to us, however, when he produces a new product for us to test. "You have been in the last four issues" I said to Bob. "But those were field reports, now a review of the antenna" he responds. True. But to readers they all seem to roll together.

All of that said, there is a new six meter Hero antenna in our antenna lot here on Provo now. That makes four antennas in operation, two of which are Hero six meter units. A spot has been dedicated for yet a fifth antenna; a Hero 7.5 meter dish. And just for the record, as you read this people are assembling a six meter ADM antenna, not for installation at our WIV studio production facility, but rather to go in up at the new WIV transmission site on mid-island. We'll be talking about the ADM six meter later this fall, after we have had the opportunity to check it out and compare its performance to the Hero.

Now the original Hero six meter here was a hand-me-down; one of the first half dozen 'proto-types' which Bob Behar assembled on his way to the present generation antennas. Bob tells me there may be ten of the original 'Preying Mantus' look-alike-mounted six meter units in operation. Our original Hero has performed for more than a year with no major electronic problems, although as we reported last fall on two occasions, the motor drive mechanics were a little on the dangerous side.

One of the real problems anyone has is deciding whether an antenna is working the way it is supposed to work. You can use a power meter to measure the CNR (carrier to noise ratio), and back into the real-world gain of an antenna, **provided** you know **exactly** what your footprint (EIRP) levels are, and **provided** you also know the **exact** operating parameters of your LNA. If you can't be sure of either of these, you also can't be sure of your antenna gain. Not by backing into a number, anyhow. We have never been sure of either of those parameters so we did the next best thing; we have always used our AFC five meter dish as a comparison 'standard'. I'm sure Microdyne/AFC has never objected to that.

Now there are dangers here as well. If you use another antenna as a comparison 'standard', you have to be very careful that you don't skirt over the line between **comparing** antennas 'A' and 'B', and making any assumptions about the real world **gain** of each. It is not difficult to determine whether one is better than the other, but to then assume you can translate the numbers into actual gain for either is a no-no. We've had to remind ourselves of this numerous times, especially when we have some visitors who are trying to equate our results to what **they can expect** with terminals elsewhere in the Caribbean.

With Tom Humphries now down here on Provo with us a good part of the time (see **CSD** for August), the temptation to force real-world numbers onto various segments of a system has grown. Tom's experience with hundreds of commercial systems, and his ability to recall from that experience little known idiosyncracies associated with various antennas and LNAs and receivers is difficult to ignore.

"Let's lift up on the front lip of the AFC five meter" he said to me one morning. I wondered why we would want to do that.

"Some of these antennas had a stress problem and after they sit on a mount for a year or so, you can often get up to 1/2 dB additional gain by lifting up on the lower, front lip." Microdyne won't like that.

I didn't either, but now we have a series of supports stuck under the front lip on the five meter dish. Oh yes, that means our 'comparison standard' has been slowly degrading in performance over the two years it has been here. One half of one dB? When you are hanging on

12 GHz RUNDOWN WHERE THE ACTION IS, WILL BE

11/12 GHz? I think it's important to differentiate between what are actually two allocations, the '12 GHz' direct (to home) broadcast band, in which the higher power DBS satellites will transmit, and the '11 GHz' fixed satellite service band, occupied in the same way as our familiar 4 GHz downlink band by nominally non-broadcast services including telephony, telex, data, teleconferencing and other telecommunications traffic in addition to TV programs.

The precise delineations of these bands vary, particularly between the Americas (ITU Region 2) and the rest of the world (Regions 1 and 3). In general they were defined at the 1971 World Administrative Radio Conference (WARC) and modified by WARC-79. A detailed plan for European DBS development, giving satellite orbital slots, frequencies, polarizations, footprint shapes and power flux densities, was agreed at yet another WARC, called WARC-BS at Geneva in 1977. Region 2 will have its own regional conference (RARC) next year, in which the American DBS pattern will it is hoped be thrashed out. America opted out of the 1977 plan, perhaps wisely, saying it was too early to decide on a DBS program which would determine patterns to beyond the year 2000 — a DBS scheme once established is a costly matter to review, and the USA has learned the lesson of being the first to adopt inadequately developed technology — I think it's fair to say just look at 525-line NTSC color television. Visitors from PAL or SECAM territory see the low definition and unnatural hues as the price America has paid for being first.

This very example points to an area where DBS might enable the USA to win-back ground. Already the broadcasters have proposed high-definition TV systems which could transform the quality of home viewing. A large increase in scanning line number is required — to more than a thousand certainly — plus a change in aspect ratio, to do justice to the wide-screen motion picture. An 8:3 ratio would accommodate the superb Panavision product without the twin torments of 'letterboxing' or even worse, programmed panning. Solid-state image sensors are under development, capable of handling such a format. Some form of standards conversion would be required to afford a measure of compatibility before such a system could supplant the existing format, but DBS could offer the opportunity to run a parallel high-definition service. Of course, the HD format would also avoid the short-comings of in-band color as well as the present system's susceptibility to phase error. And DBS could offer the bandwidth to do it all, even to transmit the whole thing digitally.

But I digress. Europe is already into detailed DBS planning and preparation of the space segment. We do not have the USA's opportunity for high definition service — the transmission parameters have already been defined, and include a 27 MHz channel width, adequate for high quality transmission of the existing 625-line standards. The nearest we come to HD is a pair of proposals from the U.K. broadcasting bodies, each for a method of separating (and recombining) the color signals from the high-frequency luminance information.

The European 11/12 GHz Scene by S.J. Birkill, Sheffield, U.K.

THE FREQUENCIES

In Europe, the DBS downlinks will occupy the band 11.7 to 12.5 GHz, which I shall call the 12 GHz band. The FSS downlinks are split into two segments, namely 10.95 to 11.2 GHz and 11.45 to 11.7 GHz. These I shall call the 11 GHz band. There is also a segment 12.5 to 12.75 GHz for business FSS, not yet occupied. Uplinks are on a variety of frequencies, in the regions of 13, 14 and 18 GHz. The point to note is the contiguity of the 11.45 - 11.7 GHz FSS band and the 11.7 - 12.5 GHz DBS band. This is of value, as I shall discuss.

SATELLITES AND SERVICES

But DBS is still some way away. Programs have been delayed or even cancelled and then reinstated. Informed opinion as of today puts the projected launch of the first true DBS (a heavy-class satellite delivering more than one TV channel to a spot beam with an EIRP sufficient to serve a terminal of one metre or less within its footprint, and intended for individual home reception in the 12 GHz band) not before May 1985, and more probably some time in 1986. (A metre, for those in doubt, is in Europe a measure of length equal to approximately 39.37 inches. A meter, on the other hand, is a measuring instrument. But I think things are different Stateside.) Front runners in the DBS stakes are the twin French and German projects TDF-1 and TV-SAT, the European Space Agency's multipurpose L-SAT (previously known variously as Phebus or H-SAT), and the British consortium United Satellites with a DBS bird tentatively called Halley-1. Also in the running are the Swiss with a project called Tel-Sat, Sweden with something called Tele-X and Luxembourg with a medium-class scheme which we shall refer to as Lux-Sat. By medium-class, I mean around 600 kg on-orbit mass, capable of being launched by a Delta vehicle. A heavy-class satellite, anything up to 2500 kg in orbit, demands a Shuttle or Ariane launch, now that the Atlas-Centaur and Titan vehicles are obsolete for commercial flights. But there is also something in Europe akin to what I have called interim DBS in the USA and Canada. There, satellites such as Anik-C, SBS or Advanced Westar, downlinking 11.7 - 12.2 GHz, offer the potential for pre-operational DBS tests. With EIRPs in the 40s they cannot serve the 60-90 cm terminals of a true DBS, but 1.5 to 3-meter terminals are quite adequate in the more favorable zones.

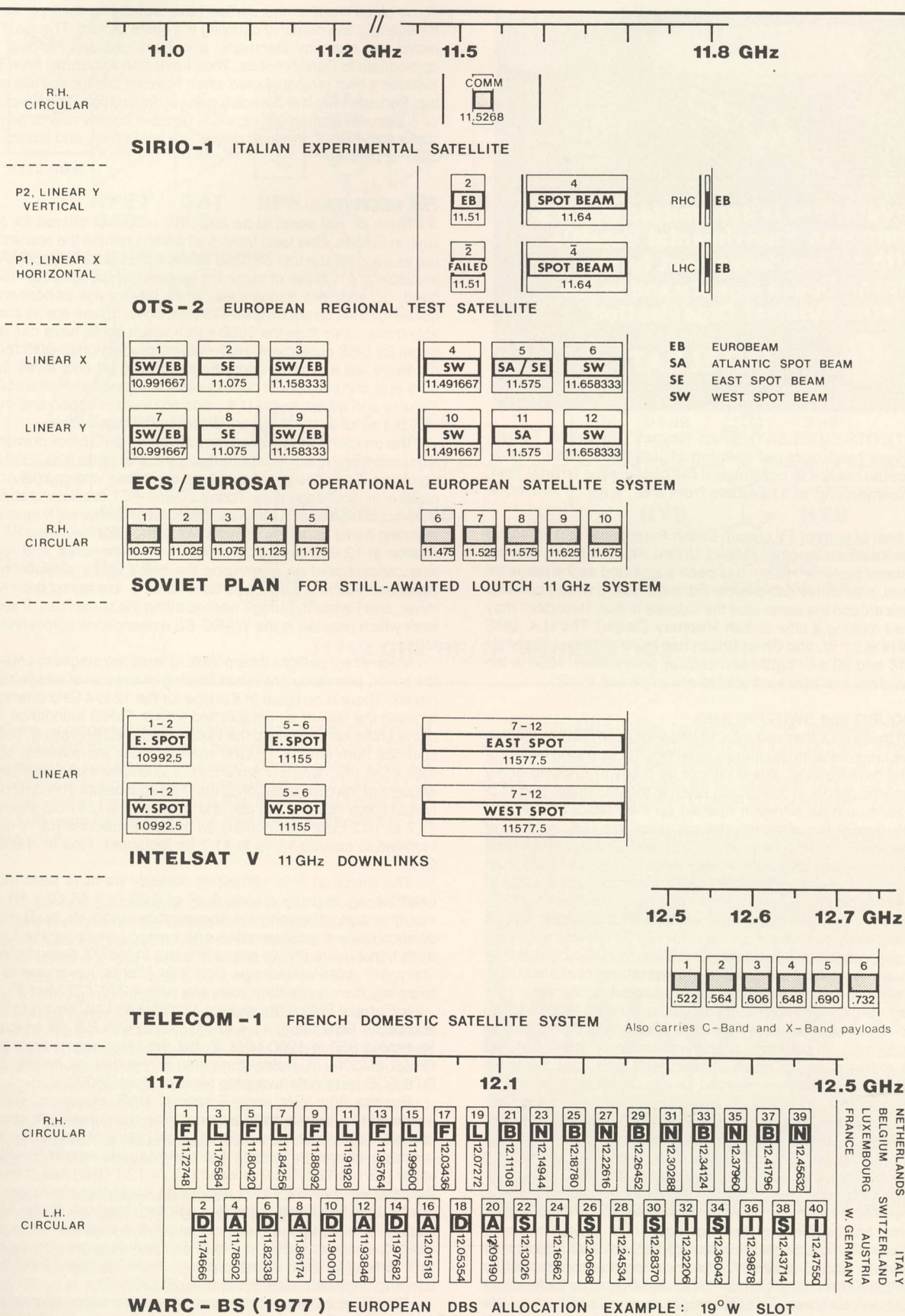
The equivalent in Europe is the medium-class 11 GHz telecommunications bird, such as ECS/Eurosat or its precursor OTS. Here again the EIRP levels are in the middle forties (dBW) and for TVRO an antennas of 3 meters or less is required. The first regular TV services on these birds are for Cable TV relay, but with the cooperation of the European telecommunications administrations, comprising the governing body Eutelsat, interim DBS tests may be permitted. It is here where the proximity of the 11 and 12 GHz bands could be an advantage. To examine the plans and possibilities, let's look at each satellite system in turn:

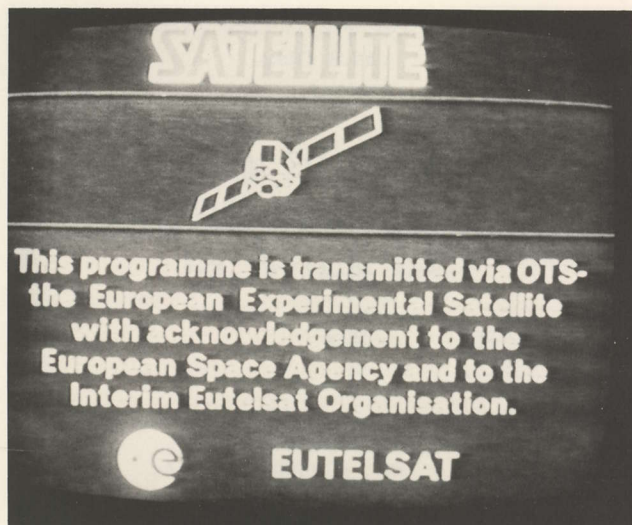
SIRIO-1

This Italian experimental bird carried the first European Ku-Band downlink, in 1977. Primarily to test propagation from geostationary orbit at these frequencies, it carried a wide-band (well, 26 MHz) communications transponder capable of relaying TV. With a beam-center EIRP of 29.5 dBW steerable to western Europe or the North Atlantic, it didn't exactly set the treetops ablaze but it did provide valuable experience prior to the launch of OTS, and was a total success for Italy. Its nominal lifetime was spent over 15°W from where it yielded below-threshold but identifiable pictures on my own 8 ft terminal on the few occasions I found it carrying TV. It has since been retired to 24.5°W. I don't know whether the wide-band transponder is still operative but its use would seem unlikely since (according to the tracking agency) it now shares an Intelsat slot, and its downlink frequency lies within the Intelsat V 241 MHz transponder 7-12 serving the European spot beam from 24.5°W. Sirio-2, scheduled for launch in September does not carry the same 11 GHz payload.

UNISAT/HALLEY-1

March 1982 saw the British Government committed to DBS for the U.K. for the **second half** of the decade. The BBC were awarded two channels on the first satellite, one a premium subscription (scrambled) service, the other a free "Window on the World" channel designed to





(SATELLITE/OTS/EUTELSAT) Brian Haynes' "Satellite Television" delivers two hours per evening of selected British Television into cable homes in continental Europe, via the Orbital Test Satellite downlinking at 11.64 GHz from 5°E.

show the best of current TV output. British Aerospace, GEC/Marconi and British Telecom together formed United Satellite to provide the British national system. 'Halley' has been suggested as the name for the DBS bird, after British astronomer Edmund Halley, whose comet is due to show around the same time the satellite is due. I wonder if they considered naming it after British visionary Clarke? The U.K. DBS orbital slot is at 31°W, and Great Britain has been allocated channels 4, 8, 12, 16 and 20 with right-hand circular polarization. 1986 is the provisional date, but again schedules are expected to slip.

LUXEMBOURG and SWITZERLAND

Both of these countries see a commercial future in DBS, extending across their own national frontiers. Luxembourg has a long history of commercial broadcasting. There cannot be many in England of my generation who did not in their youth listen to the pop music output of Radio Luxembourg as skywave opened up the medium waveband after dark. Before the offshore stations gave the U.K. a taste of commercial radio broadcasting in the 60s, there was only Luxembourg serving the demand for current popular music off disc, most youngsters having discounted BBC light entertainment's pathetic attempts to be 'trendy'.

Things have changed in the radio world, but Luxembourg sees a similar opportunity to meet a demand for highly popular television programming, funded by advertising, and it seems inevitable that they will eventually establish an international entertainment channel, taking advantage of their larger-than-strictly-necessary footprint.

A Luxembourg service could be set up using an expanded medium-class rather than heavy-class satellite, giving them a choice of several spacecraft platforms already available on European and American markets, and a much shorter lead time than would be required for a heavy satellite. Beyond an intention, I have no further news of their plans.

Switzerland could similarly use a 'stretched' medium-class bus, and they too have announced the intention, to fly a bird called Tel-Sat with programming in French, German and Italian. Switzerland and Luxembourg join the other crowd allocated the 19°W orbital slot.

SCANDINAVIA

The story has been one of on-off-on again over several cycles. It hinges upon the dichotomy between Nordic unity and national insularity. First a Nordic satellite system was proposed, Nordsat, to include national services to Sweden, Norway, Denmark, Finland and Iceland, as well as channels allocated for each country to feed the Nordic group. Norway and Sweden led the motion, but it seems as if at

some stage most of the parties have withdrawn their participation, threatening and certainly delaying the entire project. The most recent move has been by Denmark, who have decided Nordsat is **not** appropriate to Danish needs. They have also withdrawn from Tele-X, Sweden's own project started when Nordsat first looked like collapsing. Perhaps they fear Swedish cultural domination. The Nordic council is discussing alternatives, while Sweden seems now to be going it alone with Tele-X. Payload details are not known, and launch before 1987 is unlikely.

THE RECEIVERS

There do **not** seem to be any DBS receivers offered for sale as such in Europe. One feels they're all waiting behind the scenes to pop out as soon as the first 65 dBW beam lights up its footprint. What is available is a number of receiving systems which will cover the DBS band, or, adjacent frequencies, while having the performance required for the current **interim**-DBS services. These are all considerably more costly than the \$500 figure which some have named as a target for DBS equipment. High-volume production of DBS receiving hardware will inevitably bring the integrated (at chip level) 12 GHz front-end, currently under development in the research labs of Philips, Plessey and others in the U.K., and no doubt in Japan and the USA too. But as of today there are a number of approaches.

The one thing they seem to have in common is block downconversion, and a first intermediate frequency in the range 900-1800 MHz is preferred. Early designs used Gunn oscillators with coaxial or waveguide or fin-line resonators. Today a GaAs-FET oscillator stabilized by a dielectric resonator is the preferred solution. In the early days of DBS planning it was generally assumed that effective low-noise RF amplification at 12 GHz would be prohibitively **expensive**, and research was concentrated on minimizing the noise figure of diode **mixers**. Japanese Radio (NHK) Labs developed a low noise ($L_c = 4.5$ dB) mixer, and Philips in Europe worked along the same lines. It was such work which resulted in the WARC-BS assumptions of receiver sensitivity.

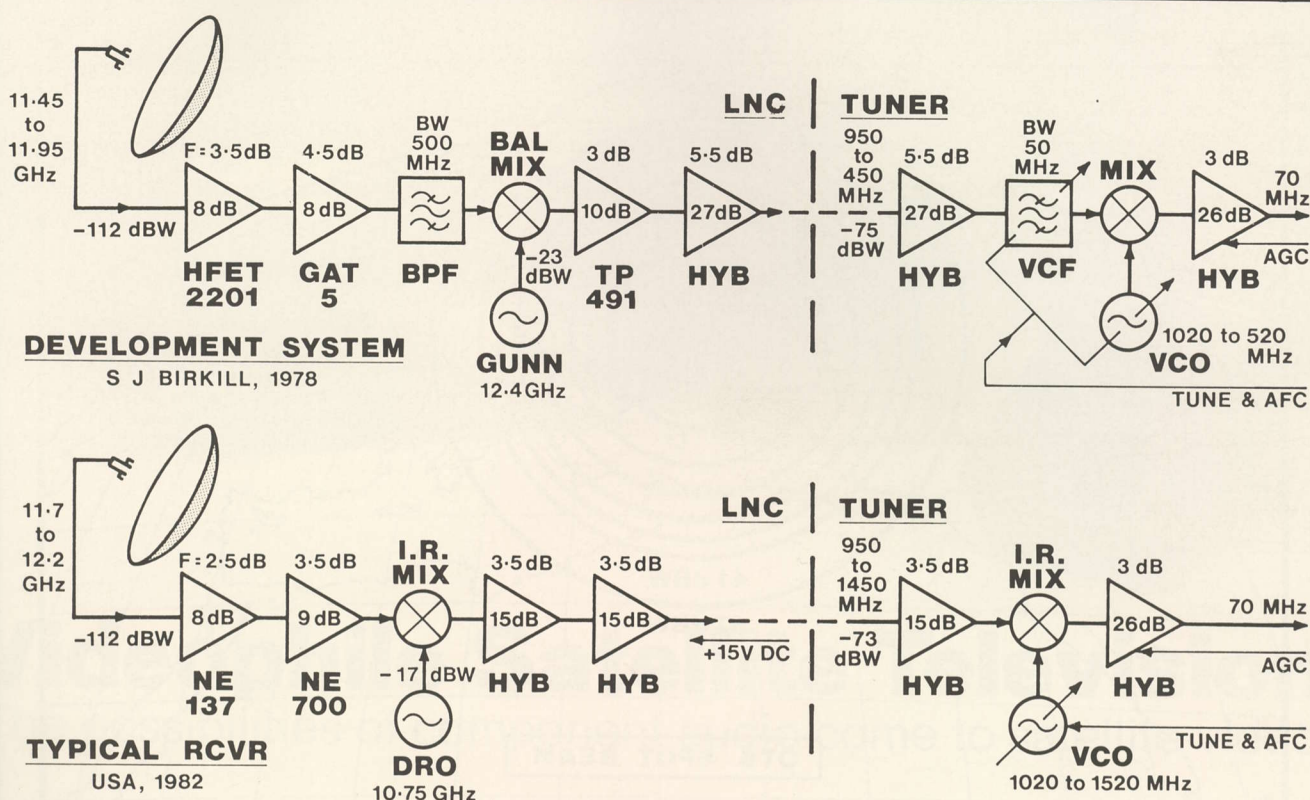
Most recent designs incorporate at least two stages of LNA before the mixer, permitting pre-mixer filtering or the use of image-rejection mixers. There is no place in **Europe** for the 12 to 4 GHz downconverter, with the lack of an established 4 GHz TVRO foundation. Stand-alone LNAs are unknown, the fixed-tuned LNC prevailing. Some are spin-offs from the US 12 GHz market. NEC, for instance, combine their 4430 LNC with a 1.8m antenna to create a package just good enough for the central region of the OTS spot beam. The LNC claims a typical noise figure of 3.5 dB, and it covers the US FSS allocation of 11.7 to 12.2 GHz with options on other frequencies (i.e. it could be modified to include 11.45 to 11.7 for instance). First IF is 0.9 to 1.4 GHz.

The choice of IF is interesting. Already we have seen moves to establish an 'industry standard' IF of 0.95 to 1.45 GHz for 4 GHz systems, and adoption of a comparable range for Ku-Band block downconverters would enable **one** indoor unit to handle LNCs for **both bands**. Already we are seeing this in the DX Antenna/VitaLink/Gamma-F receiver package. Scientific Atlanta, never one to do the following, have gone their own way with a 270-770 MHz IF.

In Europe, Philips are making available an LNC covering the OTS and upper ECS band, 11.4 to 11.7 GHz, with 3.5 dB typical noise figure and 950 to 1250 MHz IF, but the price seems high at some £2500 (\$4500). A Dutch company is reported as having 2-meter OTS/ECS **terminals** available for **less than** \$5000.

For the 800 MHz wide European DBS allocation, WARC-BS assumed that the full band would not be manageable in one downconverter without at least switching local oscillator frequency, so each country's allocation (except Scandinavia) lies wholly in either the upper (12.1 to 12.5 GHz) or lower (11.7 - 12.1 GHz) half of the band. But receiver manufacturers are facing up to the challenge, and it seems that **full band** capability **will be** standard. Radio Masts of Northampton, England, have announced a downconverter and receiver package covering 11.7 to 12.5 GHz (with extension downwards to 11.5 GHz for OTS if required) with first IF of 900-1700 MHz, and claiming a typical noise figure of 3 dB (290°K).

Otherwise it remains to be seen what other manufacturers have up their sleeves. Europe's Fuba and Japan's Sony have displayed mod-



11/12 GHz RF/IF SCHEMATICS

els of 90 cm — range antenna systems for home use, and may be ready to meet DBS demand. So far I have not had the opportunity to evaluate any of the equipments mentioned. The photographs here are of reception with my own development system for OTS covering 11.45 to 11.95 GHz with a first IF of 450 to 950 MHz. Noise figure in the region of 4 dB using the HFET-2201 in the LNA, and a system G/T of some 20.5 dB/K.

OTS

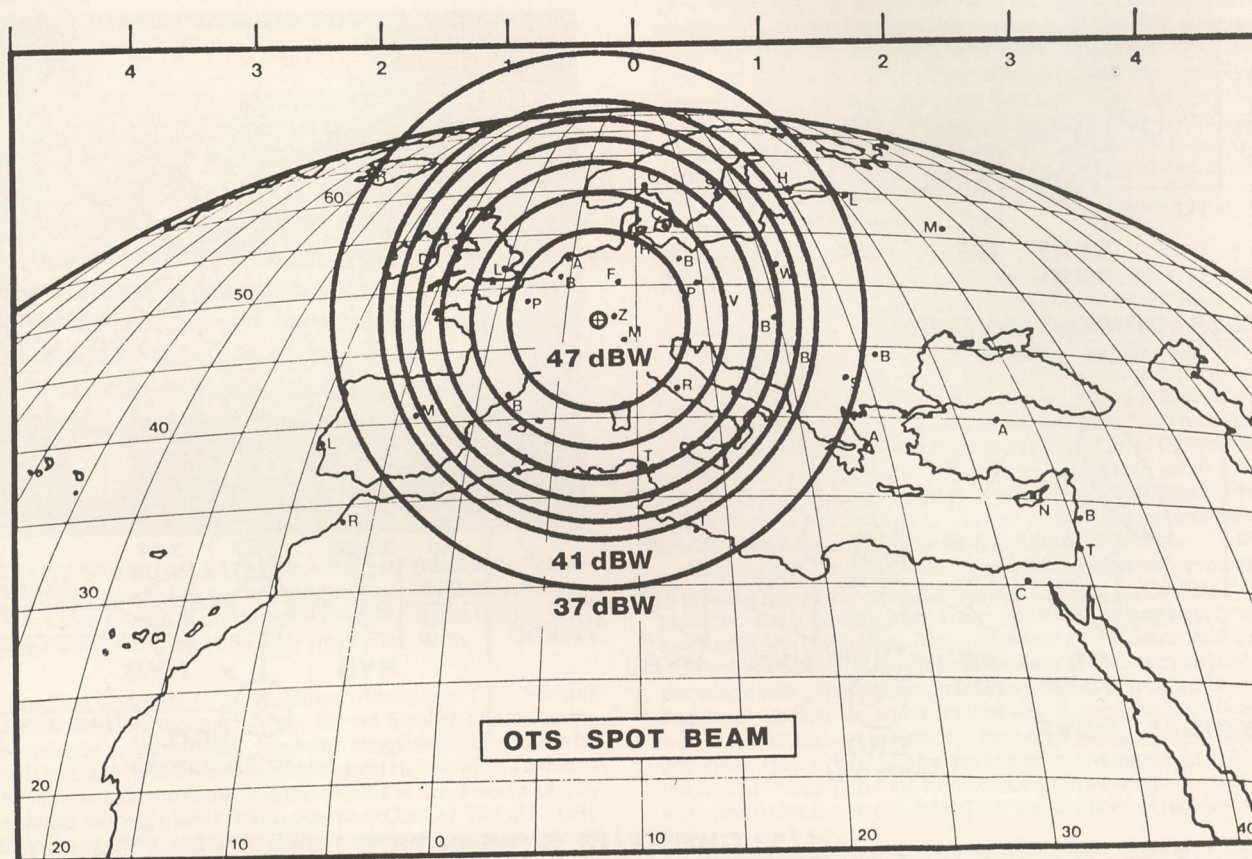
The Orbital Test Satellite was conceived by the European Space Agency as a test bed for the components of their European Communications Satellite project (ECS), due to provide intra-European telecommunications in the 1980s. The first flight model was lost at launch in September 1977, and OTS-2 flew in May 1978. Originally ECS was to carry a combination of 40 MHz transponders serving the whole of Europe via an elliptical "Eurobeam", and 120 MHz transponders covering the dense traffic western region in a narrow spot beam of higher EIRP. OTS was equipped with two of each type in its Module A, employing frequency re-use by polarization isolation, orthogonal linear polarizations being employed. Module B contained a pair of narrow-band transponders (5 MHz) using circular polarization. Perhaps the primary mission for OTS was to prove the concept of polarization isolation at these frequencies in all weather conditions, and to compare the merits of linear and circular orthogonal polarizations.

A degree of redundancy was built into the communications package, but one of the 20W TWTAs, that serving channel 2 (two bar) failed with no backup, putting that channel out of action. The other three wideband transponders are fully operational and in everyday use, despite the spacecraft having exceeded its nominal lifetime. The downlink HPAs, of 20W RF output (nominal) deliver an EIRP of some 47 dBW at spot beam center, when driven to saturation. The Eurobeam figure is some 10 dB lower.

The 120 MHz usable bandwidth of the spotbeam channels is something of an embarrassment when it is not being exploited for digital transmission modes. When the highest possible transmission quality has been demanded, as for broadcast relay, the opportunity has on occasions been taken to offset the transmission frequencies in



One of the UK IBA's Pan-European test transmissions. The video carries standard (not scrambled) Sound-in-Syncs, and a digitally modulated subcarrier is used for additional multilingual audio channels. These transmission via OTS are coordinated by the European Broadcasting Union.



the two cross-polarized channels by equal amounts in opposite directions from the channel center frequency (11.64 GHz) to reduce to zero the small probability of co-channel interference. Additionally, a wider deviation is used ('Eurovision format') for broadcast relay, occupying some 40 MHz bandwidth to improve recovered video S/N over that obtained in the 27 MHz wide 'DBS format' used for Cable relay and DBS tests.

OTS has been maintained on station at $10^{\circ}\text{E} \pm 0.1^{\circ}$ except for three occasions during the first year when the spacecraft attitude was adjusted to slew the spot beam to North Africa for small terminal TVRO demonstrations, when the effect of the repointing on routine station keeping burns was underestimated and OTS drifted westwards by almost 0.5° . North-south station keeping has maintained orbital inclination within the $\pm 0.1^{\circ}$ tolerance throughout the mission. Towards the end of April 1982, OTS was maneuvered to a new station at 5°E to make way for the launch of the first operational European Communications Satellite ECS-1, which was expected in May. Since then ESA have been experiencing problems of static-induced transients with the maritime communications satellite MARECS-1, based on the ECS spacecraft bus, and has had to postpone the MARECS-2 and ECS-1 launches while the birds are static-proofed. ECS-1 is currently expecting to fly in January of 1983, with ECS-2 following later in the year, all being well. Orbital slots are 10°E and 13°E respectively, with OTS living out its days at 5°E .

Satellite Television Ltd was formed in 1980 by Brian Haynes, a former Thames Television producer, who saw the potential of OTS to carry an interim DBS-type service, after the completion of ESA's planned Orbital Test Program when the satellite would be largely uncommitted. After much negotiation involving Eutelsat, the telecommunications authority British Telecom and the government regulatory body (the Home Office), STL received permission to operate via OTS an English-language commercial TV service, for reception in Europe. In fact current broadcast and cable TV regulations forbid STL to

transmit to the U.K. and the licensing machinery does not exist, other than for the occasional development permit.

Meanwhile, the French had established a regular transmission schedule via OTS. The commercial second programme, Antenne-2, was up on the bird each evening, as a point-to-point relay to French-speaking Tunisia, and already free enterprise was moving in. The Dutch cable operation Kabel Televisie of Amsterdam installed a three-meter terminal and began relaying the French programs to its 300,000 subscribers. French TV didn't object — here was extra advertising revenue. But the Dutch telecommunications authority took a hard line, the Dutch government already being sensitive about foreign cultural invasion, largely by television. Representations to Eutelsat, of which the French PTT is a member, brought pressure to bear on the French broadcasters who were obliged, against their will, either to cease the Tunisia feed, or, to scramble it. They chose scrambling, which effectively killed the Dutch cable relay (stunned it at least), causing them to switch to 4 GHz and carry Soviet TV via Ghorizont-4 instead.

Back in England, STL began with a modest test transmission and some loud publicity. From the 9th to the 17th of October, 1981, using the facilities of Television International in London, STL transmitted each afternoon a one-hour selection of film 'shorts,' uplinked I believe from British Telecom's Goonhilly Downs earth station, (though one source suggested STL were using their own uplink) via spot-beam transponder 4 of OTS, to a handful of demonstration terminals in continental Europe. For the second half of the week the film items were interspersed with commercials, giving STL still more publicity in the world of advertising.

These test transmissions were not scrambled, and the accompanying sound was transmitted by 6.6 MHz subcarrier, but as a result of the Antenne-2 affair Eutelsat dictated that STL's **full service** be scrambled. So they adopted the Oak Orion system, and began test

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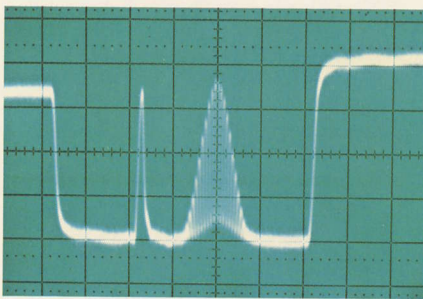
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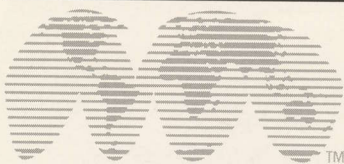
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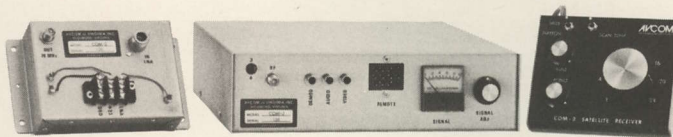
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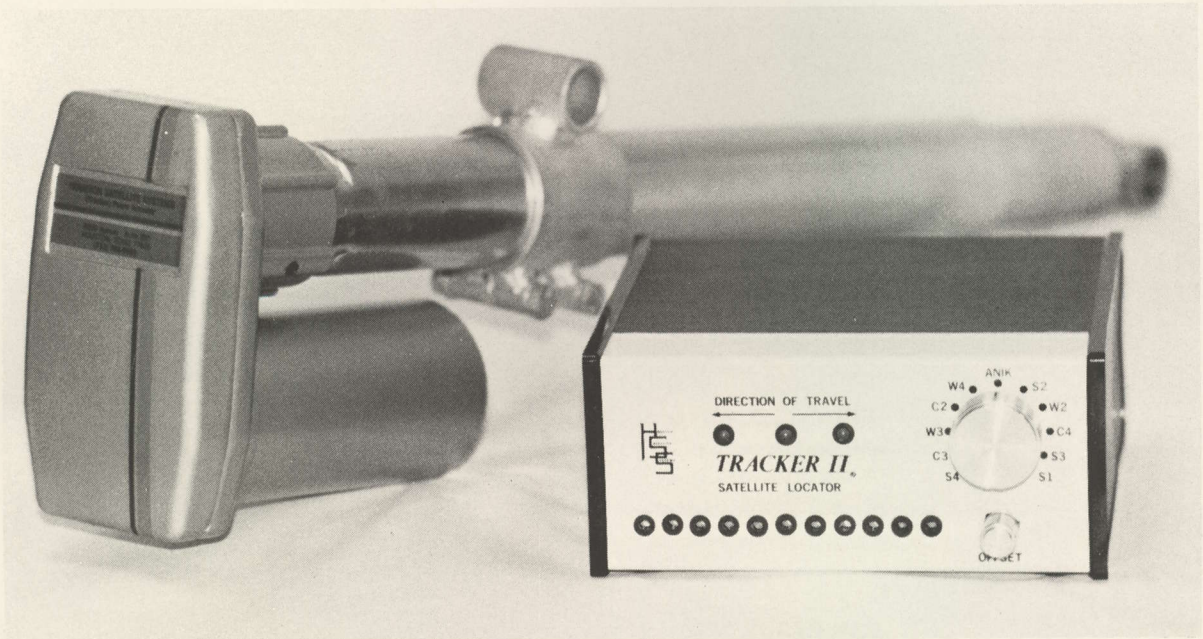


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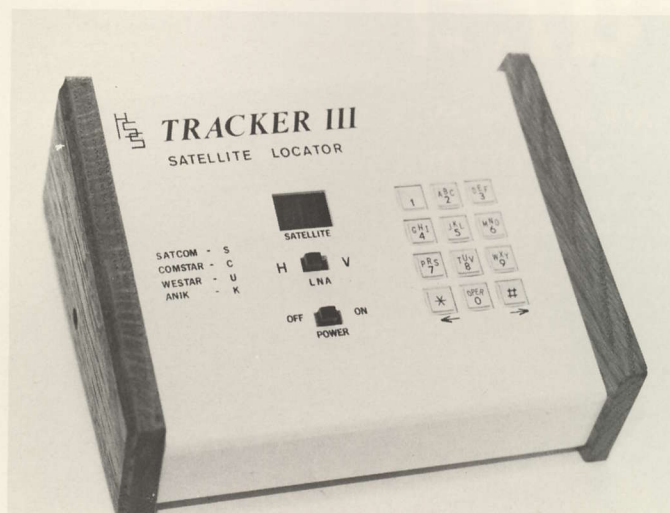
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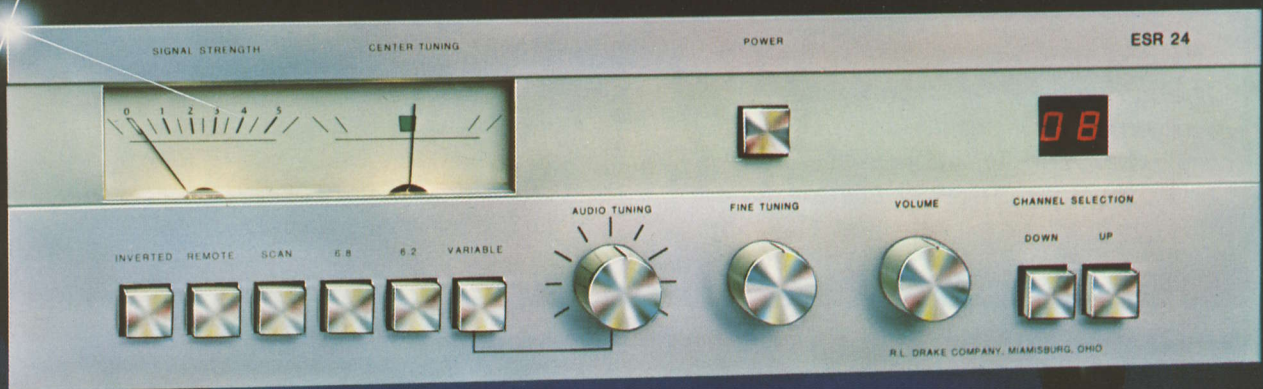
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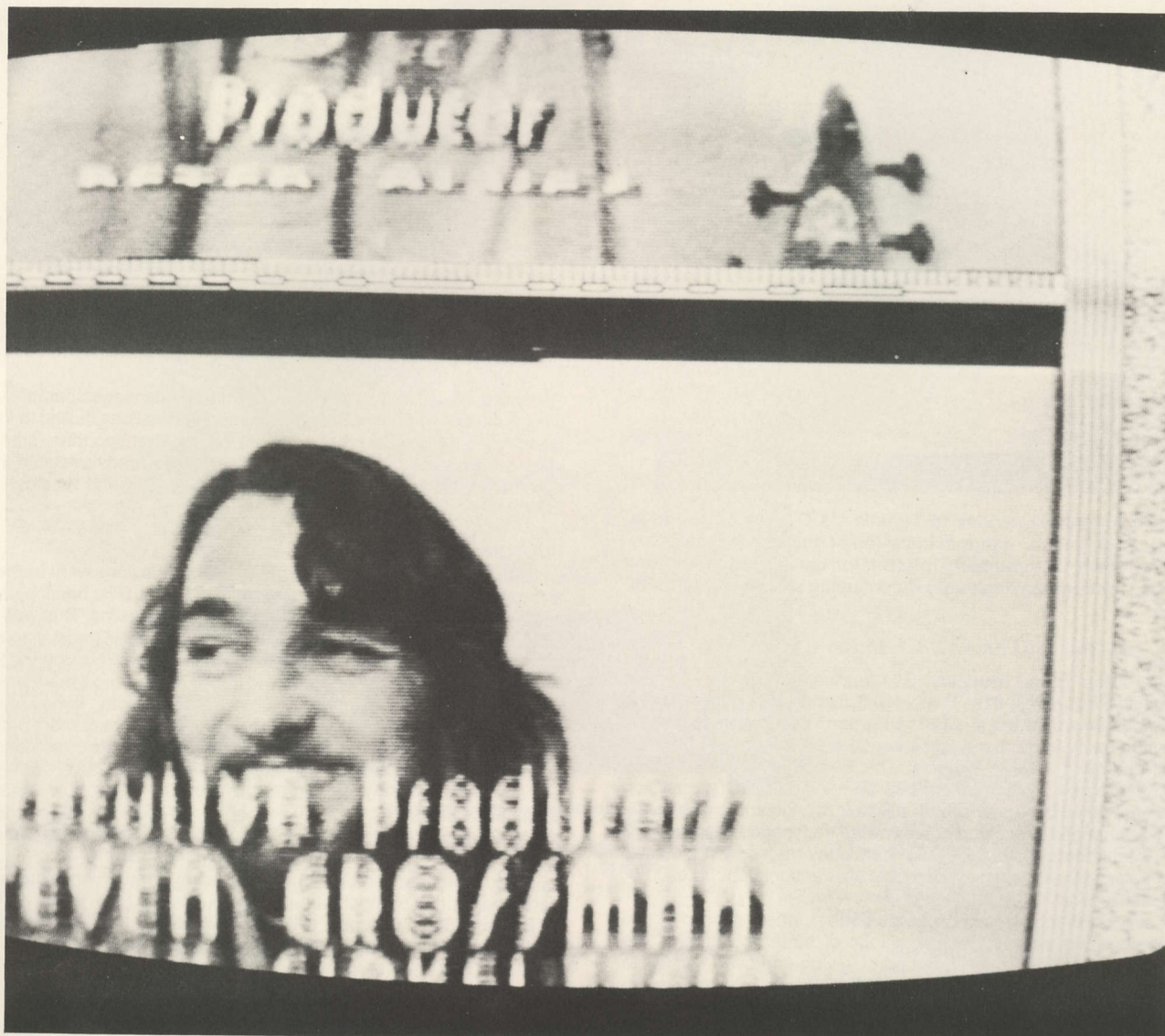
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Europe's service "Satellite Television" employs a version of Oak's Orion scrambler. This purposely-phased shot shows the HF sine wave which defines line and field sync edges, the addressing data codes (the dots and dashes after field sync but before the blanking bar) and the digitally encrypted audio, looking like a bar of noise down the right of the screen.

transmissions towards the end of February, 1982. These continued through March while STL struggled with the logistics of getting licences and descramblers to potential cable customers in Europe. An operational service of two hours per evening commenced on April 26 on transponder 4 (the French have the use of transponder 4 during the evenings) and continues to date. Molinaire of London provide studio facilities, and the programs are uplinked from the British Telecom Facility at Martlesham. Program content consists largely of successful TV drama product previously shown on British Television (BBC or ITV), plus a selection of musical 'specials' from the worlds of classical, jazz, rock and country. Major feature movies are promised for the future.

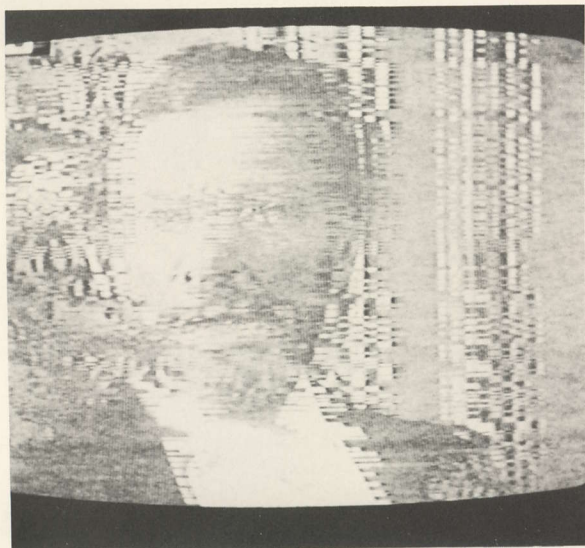
It is known that STL now has permission to transmit to Malta, Finland and Norway. Belgium, Holland, Sweden, Switzerland and Yugoslavia are also interested but it is believed those countries' PTTs could in some cases provide opposition. The Dutch, for instance, do not allow cable TV relay of STL at present on account of its advertising content, but they have authorised private reception of 4 GHz Soviet TV and turn a blind eye to its presence on cable systems. Denmark and Germany are believed to have reacted by making it a criminal

offense to **possess** non-DBS satellite receiving equipment.

The OTS spot beam is boresighted close to Bern in Switzerland, and its 3dB-down contour encompasses all of Germany, France, Austria, Switzerland, Denmark and the Benelux countries, most of England, Wales, Scotland and Italy, southern regions of Norway and Sweden, much of Yugoslavia, and extends to Tunis in north Africa. Within this region Cable TV grade service is assured with a 3-meter antenna and an LNC in the region of 4 dB noise figure. In the central zone an antenna as small as 1.5 metres will provide a service, while a 6-meter installation will give cable grade service out to the 37 dBW contour. Marginal performance, good enough for individual reception, can be achieved 3 dB further out from boresight with the systems in these examples.

ECS

One constraint facing those who specify such systems is the limited lifetime of OTS. The spacecraft looks like remaining serviceable through 1983 (its official life was three years) but ultimately any service will face closure or transfer to ECS. But as we shall see, there are differences in the ECS footprints which must be taken into



France's Antenne-2 service to Tunisia via OTS employs video scrambling by pseudo-random insertion of one or two time-delay periods. Again, descrambling information can be extracted from the video. Accompanying audio is sent using standard Sound-in-Syncs.

account.

The design of the European Communications Satellite System has evolved since OTS flew. The biggest change was to transponder bandwidth. Since 40 MHz and 120 MHz transponders were proposed, there has been some standardisation on a bit rate of 120 Mb/s for digital (including TDMA) systems. The European PTTs' proposed digital formats can most economically be handled by a transmission channel of **80 MHz bandwidth**, or a little less. Accordingly, the ECS plan was changed to accommodate **twelve** transponders, **each of 72 MHz** useable bandwidth. Like OTS, frequency re-use by orthogonal linear polarizations is employed, that is six transponders on each of two polarizations.

A second change was to the beam pattern, where instead of one 'Eurobeam' and one spot beam, a total of three spot beams are furnished in addition to the 'Eurobeam', giving improved service to small terminals in the dense traffic zones. These spot beams are larger than that on OTS, and with the same TWTAs of 20W saturated output power this means boresight EIRP is some 2 dB lower than the OTS beam.

Thirdly there is the matter of north/south station keeping. The original ECS design called for substantial economies in the amount of station-keeping hydrazine fuel carried. OTS was maintained within 0.1° of the equatorial plane, which operation consumed some 7 kg of hydrazine each year. For a 7-year ECS lifetime this demands around 50 kg of payload mass being lost to fuel. To dispense with N/S station keeping, leaving the E/W correction to $\pm 0.1^\circ$ of nominal longitude would require a total of only 5 kg of hydrazine for the entire 7-year period. This would be done by arranging for the initial geosynchronous orbit to have some 3.5° inclination, aligned such that the natural drift gradually reduced the inclination to zero and back to 3.5° in the opposite sense, over the spacecraft's seven-year life. Operationally this would mean **all** earth terminals tracking the satellite as it followed its figure-8 shaped apparent diurnal motion, 3.5 degrees north and south of the equatorial plane over the course of a sidereal day. We are used to doing this for Symphonie and even for Gorizont when using a large terminal, but it would multiply the cost of a small terminal at 11 GHz. Now ESA has appreciated the potential of ECS for TV delivery to small terminals they would seem to be bound to adopt N/S station keeping and absorb the mass penalty. I am confident this has occurred, though I have received no confirmation of the change.

With regard to transponder allocations, the system's capacity has been jealously guarded by the PTTs forming Eutelsat. Initially only two ECS-1 transponders were allocated to television, for EBU use as part

of the Eurovision network. The others were to carry telecomms traffic of various sorts. Since then OTS has proved its worth for TV OB feeds and pan-European cable services, and it is likely that even before the spare capacity on ECS-2 becomes available we shall see a considerable amount of TV on the ECS system. Brian Haynes' STL (now Satellite Television PLC) for one has obtained an assurance that ECS capacity will be available to provide continuity when OTS expires.

A new contender for pan-European service has emerged in the last year. Dieter F. Minning and ESA consultant Dennis L. Brown have proposed a 24-hour per day English language service, Euro-TV, out of Holland and with Dutch subtitles, to be funded by subscription. Alternative subtitling will be via teletext. In this case scrambling will be adopted for a rather more practical reason than the insistence of Eutelsat. Euro-TV hopes to be on the air via transponder 4 of ECS-1 during 1983, and may offer the **first premium service** to sell on its own merits, rather than on the novelty of satellite delivery. Euro-TV **has announced** its willingness to accept **private subscriptions** from those **not served** by cable.

ECS primary power constraints permit simultaneous operation of nine of the twelve transponders during sunlit conditions, falling to five at eclipse. Eurovision channels will be half-transponder (cross-polarized signals offset) on Eurobeam; cable TV feeds will be in the main on Spot West, initially on transponders 6, 12, 4 and 10, close to the DBS band-edge.

LOUTCH

I say Loutch only to give a name to it. The Russians went further, and gave it a downlink channel allocation in the 11 GHz band, plus a number of orbital longitudes and nominal beam patterns. That was in 1976 when they filed with the ITU the plans for their geostationary Stationar satellite systems. As we have seen at 4 GHz, the implementation has in some areas followed the plan, in others it has varied. We do not know the status of the Loutch project today. It may have been delayed for technological reasons, such as development problems with the HPAs. It may be on a back burner with increased emphasis on C-Band systems. It may, like Gals, have been or be in the process of being integrated into another system. (Gals, a military communications satellite chain planned for 1979 has not appeared, but the Gorizont satellites carry an X-Band military payload). Or, it may fly tomorrow!

Loutch (pronounced Looch) means beam, or ray. Eight locations were filed, four for preoperational birds Loutch P1 - P4 at 25°W , 45°E , 85°E and 170°W , beginning in 1979, and four for operational birds Loutch 1 - 4 at 14°W , 53°E , 90°E and 140°E , corresponding to Stationar slots 4, 5, 6 and 7 respectively. Ten transponder frequencies were announced, with 34 MHz usable bandwidth per channel, serving zone beams of 40 dBW maximum EIRP; FSS rather than DBS levels. A Loutch-type system, whether of that name or another, would extend Intersputnik operations to Ku-Band. But we have seen no sign of its appearance, unless the experimental satellite Kosmos 1366 launched May 18, 1982, turns out to be a test-bed for an 11 GHz system. At the time of writing this bird is in a near-geostationary drift orbit and is expected to commence communications tests when stabilized.

INTELSAT V

There seems to be a degree of confusion in the satellite world over what type of numerals to attach. But there's no doubt with Intelsat, where the Roman numeral always attaches to the class of bird, in fact the generation of Intelsat, with additional letters to denote an expanded class, such as Intelsat IVA and Intelsat V MCS. Arabic numerals are then used for the flight number, F2 and so on.

Not a European system but included here because there's no engineering reason why it couldn't function as such. A total of 390 MHz bandwidth is allocated to each of two linearly polarized 11 GHz spot beams, western at 47.4 dBW max EIRP and eastern at 44.1 dBW max. In the Atlantic Ocean Region, where the **Primary bird** at 24.5°W is currently an Intelsat V (F3), the western spot covers the U.S. northeast and the eastern spot covers western Europe. These spot beams are at present under-utilized and, pending expansion of TDMA systems, **could be** used for TV relay. Europe generally has a considerable appetite for American TV, any American TV, and Intelsat V could provide the channel for a live feed, to cable outlets in Europe or

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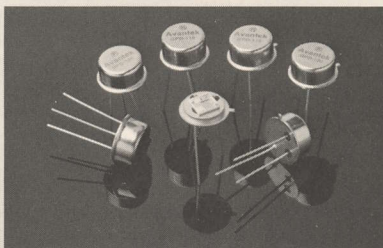
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Generic Type	Avantek Model	Frequency Response, MHz	Gain, dB (-55 to $+85^{\circ}\text{C}$)	Typical Noise Figure, dB	Typical Power Output, dBm
MWA	GPD				
	-110	0.1—400	13	3.5	-2
	-120	0.1—400	13	5.5	+8
	-130	0.1—400	12	7.0	+17
	-310	0.1—1000	7	6.0	-2
NONE	-311	0.1—1000	12	5.5	-2
	-320	0.1—1000	7	6.5	+8
NONE	-321	0.1—1000	12	6.0	+8
	-330	0.1—1000	6	7.0	+16
NONE	-331	0.1—1000	10	7.0	+16
	-410	0.1—1300	10	6.0	-2
NONE	-420	0.1—1300	10	6.5	+8
NONE	-430	0.1—1300	8	7.0	+15

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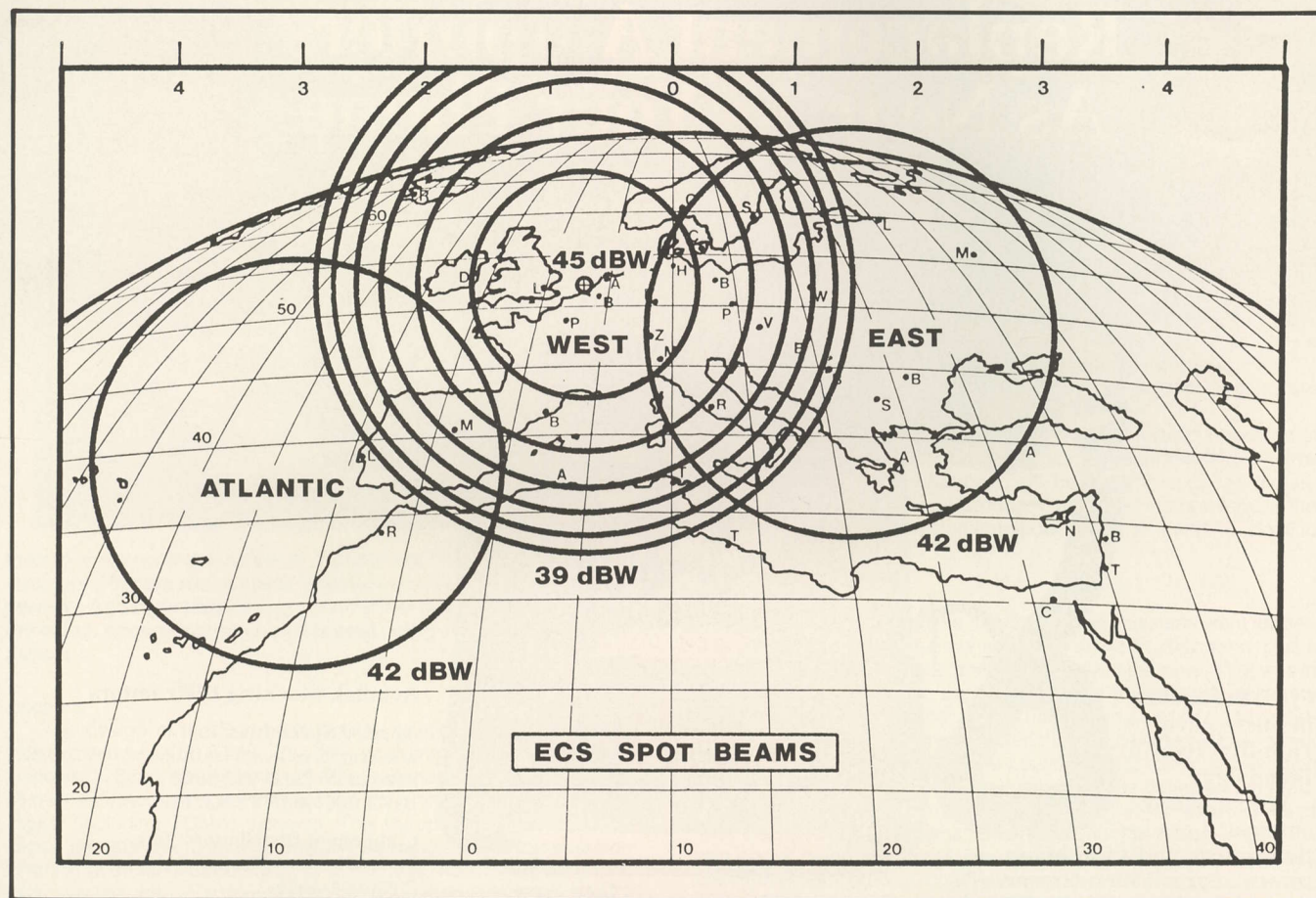
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even for retransmission via an eventual DBS.

TELECOM-1

Based on the ECS platform, Telecom-1 is to be France's telecommunications system for the 80s. Three communications packages will be carried on the Telecom-1A and 1B satellites to be launched in 1983 and 84 to orbital slots at 10°W and 7°W respectively. A C-Band payload will take over the role of Symphonie in Telecommunications with French overseas territories, an X-Band payload will provide integrated military communications (the Syracuse system), and a Ku-Band payload will offer six 36 MHz transponder channels downlinking in the 12 GHz band (above the DBS allocation) to a spot beam serving much of western Europe with an EIRP of 44 dBW or greater, over 47 dBW in the central zone (most of France, Germany, all of Switzerland, Belgium, Netherlands, Luxembourg and part of England, Austria and Italy.) Among the plans for these transponders is at least one for full-time TV, a service of French broadcast association Video-transmission International. This too could amount to preoperational DBS as early as 1983, particularly if channel 1 be used, adjacent to the DBS band.

TDF-1 and TV-SAT A3

For true DBS according to the Geneva plan, that is DBS for individual home rather than community reception, a power flux density of at least -103 dBW/m^2 on the ground is required within the primary service area. This is based upon good reception on a 90 cm antenna for 99% of the worst month, using the receiver technology current in 1977. If we assume that 99% of worst month corresponds to a path attenuation of 1 dB over free space, we find ourselves looking at an EIRP in the region of 61 dBW minimum (!). To provide this in a beam covering a European country requires a satellite-borne HPA of between 150 and 450 watts saturated output power, per channel, depending upon the size of the country. Certain countries (Luxem-

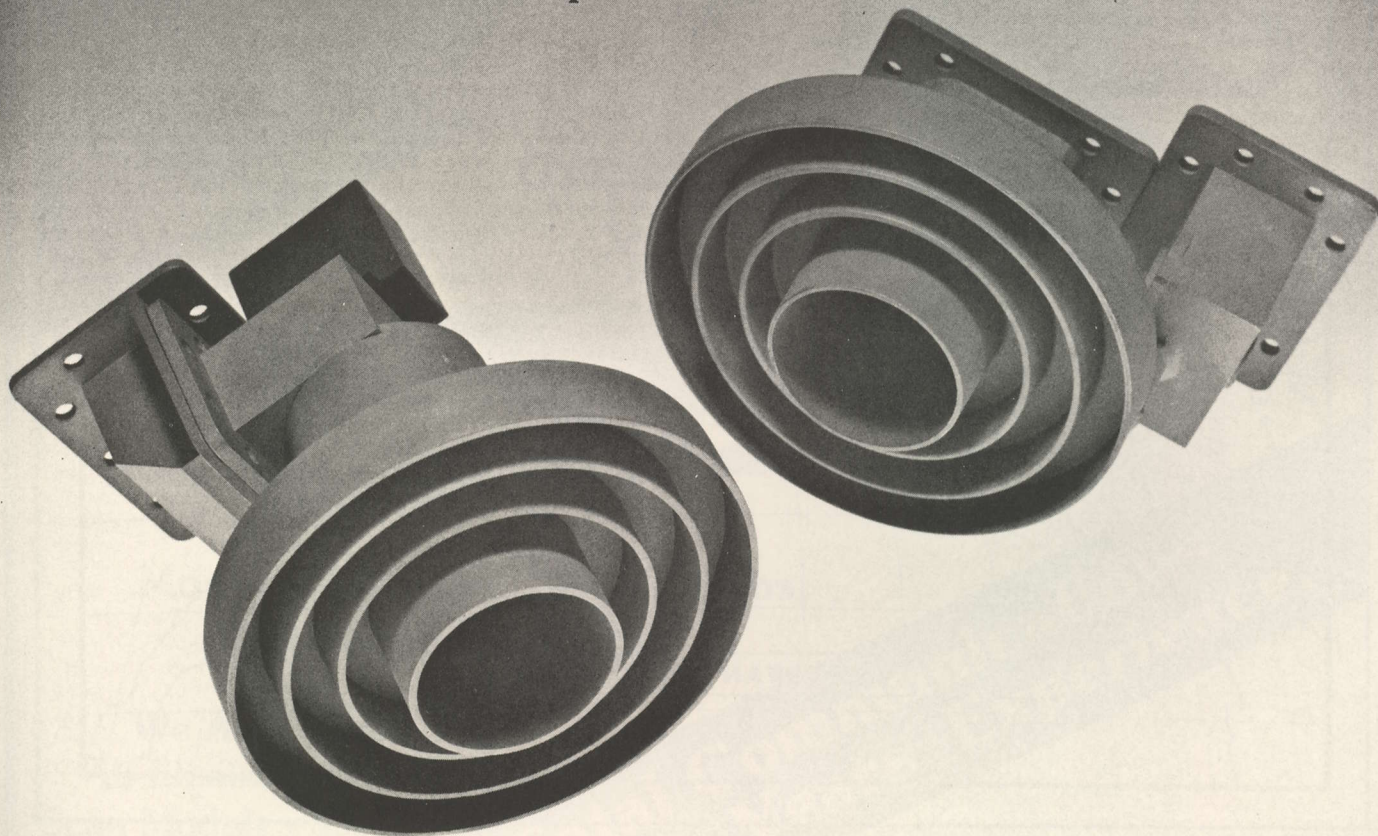
bourg, Monaco, Vatican State, Andorra, San Marino, Liechtenstein) have accepted a beam allocation rather larger than necessary to cover their small area because of the impracticability of a very large antenna in orbit.

The 1977 plan assumes a receiver sensitivity (G/T) of +6 dB/K. That equates to a system noise temperature of 1800°K with the suggested 90 cm antenna. But 3 dB noise figure LNCs are now available, giving a system noise temperature of only some 330°K — over 7 dB improvement. So we can use a 40 cm (16 inch) dish, or, re-define the space segment or consider that the footprints in reality extend well outside the nominal service areas, permitting for instance U.K. reception of French, German, Luxembourg and Scandinavian DBS, as well as British. But the space segments are well advanced, largely in accordance with the Geneva plan. **Reception is going to be a doddle!**

First to set the wheels in motion were the French and the West Germans, in the kind of collaboration that gave us Symphonie. The two countries agreed to pool resources in technology, and to provide mutual backup in the event of space segment failure. But each spacecraft development and integration program proceeded independently.

At present Germany is expected to be up first with the pre-operational bird TV-SAT A3, perhaps as early as May 1985, but subject to possible delays. A3 will be equipped for all five channels allocated to Germany at WARC-77, but will in fact operate only three transponders simultaneously, two being held in reserve. EIRP will be a 65.5 dBW beam covering West Germany, with left hand circular polarization from 19°W. RF power in each channel will be 260W from an AEG-Telefunken helix-type TWT. The spacecraft is designed for a 7 year minimum life with antenna pointing and N/S and E/W station-keeping within $\pm 0.1^\circ$. The operational satellite, TV-SAT A5, capable of supporting all five channels simultaneously, is expected two years later.

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Hard on the heels of Germany comes France with TDF-1. Similar in concept, it will be equipped with three of the five French DBS channels, each served by a combined pair of 220W TWTs to give the required 350W, delivering a PFD greater than — 103 dBW/m² over mainland France and Corsica, and extending at this level into England, Belgium, Luxembourg, Germany, Switzerland, Austria, Italy and Spain. **Community reception** will be possible **throughout western Europe**. TDF-1 is due to go up in late 1985 or early 1986, and will be stationed again at 19°W.

L-SAT

L-SAT is the name given by the European Space Agency and its main contractor, British Aerospace, to the Ariane Large Satellite Platform. This is a multipurpose spacecraft design aimed at exploiting the capability of ESA's Ariane launch vehicle to place heavy satellites into geosynchronous transfer orbit. Ariane now has its own commercial

operation. Arianespace, selling launch capacity to satellite operators worldwide, in competition with NASA. Ariane launches take place from the French space center at Kourou, French Guiana in South America, on the coast adjacent to the notorious Devil's Island and just over five degrees from the equator; a near perfect location for geosynchronous flights.

L-SAT is adaptable to take a variety of payloads, including DBS, Domestic or Regional fixed service, Global trunk, lease or mobile service, or specialized commercial services including data communications using SS-TDMA. The first flight model, expected 1986 or 87 for the popular 19°W slot, will be equipped with **two** high power DBS channels, one as a pre-operational service with a fixed footprint covering Italy, the other as a test and demonstration DBS facility, steerable to serve almost any part of Europe. The Italian beam will comply with the Geneva plan, delivering a PFD in excess of - 103

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JULY — Help!

Somehow the July issue of CSD ended up short at the mailing service. There were at least 25 people who are subscribers who did not receive their July copies because the mailing service ran out of magazines. There were also another several hundred who received TWO copies of the July issue. If just 25 or so of you hoarding a pair of July copies would kindly return the extra copy, to Carol Graba, you would make another 25 people very happy. Oh yes, the mailing service says it will never happen again. We'll see.

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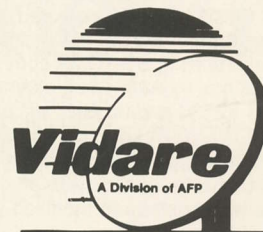
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(SATELLITE/TIME ZONE CLOCKS) A rare sight in Europe, though common in North America: on-screen clocks for three time zones, at the close of Satellite Television's evening program.

dBW/m² over Italy, with left-hand circular polarization in WARC channel 24. The steerable EBU beam will operate in channel 20 or 28 with a choice of polarization.

L-SAT will also fly a specialized service mission to test advanced business communications with a multibeam antenna covering Europe and an SS-TDMA package similar in operation to that on America's Advanced Westar. This is expected to downlink in the band 12.5 - 12.75 GHz. Also on L-SAT 1 is a multi-channel 20/30 GHz payload to test teleconferencing, SS-TDMA communications and other specialized applications through small steerable spot beams. Propagation beacons on 12, 20 and 30 GHz will also be carried, with European coverage.

L-SAT 2 was planned to follow a year behind L-SAT 1 and be committed primarily to DBS, with an option for 5-channel UK coverage. Plans may have been modified with the announcement of the UK's DBS decision.

OMAHA / Preliminary

The 'first annual trade show' for the Society (of) Private And Commercial Earth Terminals is now history. Hundreds and hundreds of industry people (if, indeed, not the thousands previously forecast) journeyed to Omaha, Nebraska at the end of the first week in August

WHAT HAPPENED IN OMAHA?

to salivate over the latest in new equipment offerings, jaw-bone about industry growing problems, and revel in the back-order status many of the industry suppliers and installers were facing. It was, on the surface, an upbeat, positive-attitude gathering.



It's raining cats and dogs, and the dish needs moving.

That could mean a soggy trek out to the backyard. But not if you equip your earth station with the ADEC microprocessor-controlled actuator system. This new actuator system lets you change dish positions easily and accurately, without ever setting foot outdoors!

The system's electronic control panel can be programmed for pinpoint targeting on all present and future domestic satellites—up to 50 positions in all! And it operates at a low 36-volt D.C. level. For installation, the ADEC actuator system comes complete with 175 feet of specially engineered direct burial cable. And waterproof quick-lock connectors eliminate the need for hand wiring.

With the ADEC actuator system, you'll switch satellites as quickly and easily as you now change channels. And best of all, you'll do it from a nice, dry living room . . . come rain or shine!

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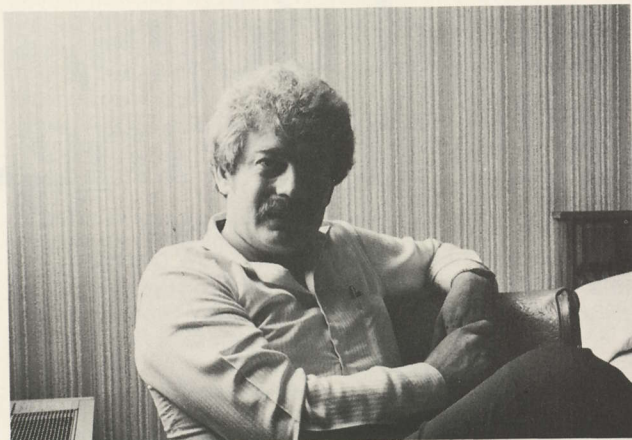
"I wasn't going to attend; I didn't see how I could possibly leave my business for a week just when the sales were going so good" remarked one Colorado dealer. "But then I realized that I had \$100,000 in installations booked, with down payments, and I was hung up waiting for equipment anyhow so I might as well go." Business, even in the remotes of Colorado, has been excellent for many of the industry's dealers.

The Butch Harper Holiday/Holidome facility had been previously visited by a Rick Schneringer show just a year prior. The facility lends itself to this type of gathering, although clearly the number of sleeping rooms required was stretched far beyond Holiday Inn capacity, and many hundreds were forced to lodge at other nearby motels. Part of this was perhaps caused by a sudden, late, influx of exhibitors who filled the more than 100 exhibit booths to overflow capacity. The same exhibitors had the foresight to reserve in advance their Holiday Inn rooms, resulting in exhibitor personnel-alone coming close to filling the host Inn facility.

If industry distributors and dealers decided late to attend, as did the Colorado installer, they did not appear to be disappointed by the show nor the facility. Show Committee coordinator Bob Behar reported 63 TVRO antennas were installed and on display (most operational) by the start of the exhibit hall hours on August 5th. And the exhibit hall proper was elbow to elbow attendees from the moment the gates opened. And while most of those fighting for walking and talking space were domestic folks, there were others on hand from as far away as Japan, New Guinea, Italy and throughout South America. A trade show, whether sponsored by Schneringer at STTI or SPACE, is bound to attract interested business people from all over the world. The interest in things international was evident in a Thursday session dealing with international satellite systems.

Perhaps the most startling news to come out of the early portion of the show involved SPACE itself, and its decision to restructure as a trade association so that a couple of the new, emerging 'sections' of the industry would have a greater voice in SPACE activities. SPACE VP and General Counsel Rick Brown had paved the way for the restructuring prior to the SPACE gathering by burying SPACE Board Members with 'vote-by-mail' issues leading up to the restructuring. Brown's **original plan** was to create three totally separate Boards (of Directors); one each for manufacturers/pioneers, another for SPACE dealer members, and a third for SPACE SMATV members. It was the SMATV issue that presented the greatest problems to the SPACE Board.

SMATV, or 'small, master antenna television' systems, are a very controversial subject at the moment. Hundreds of TVRO systems have been installed in apartments, condominiums, motels and hotels in the past year. They fall into two categories; those that **have** obtained 'license' to use the satellite programming which they deliver, and, those which have **no authority** to distribute the programming. A new, rival perhaps to SPACE (in this limited area) trade association



GUY DAVIS, JR. of InterSat Corporation is one of the young 'turks' that would like to be an active part of the SPACE Board. The battle for limited Board seats is upon us.



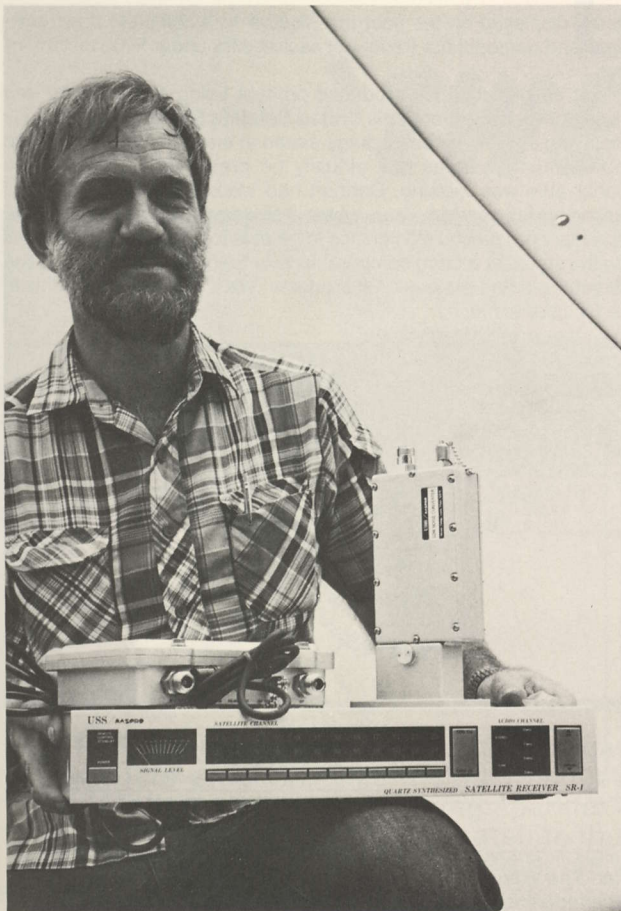
OMAHA '82 ala SPACE.

sprung up this past spring to represent those SMATV operations which are, or would like to be, in the 'legal' category. Brown sensed that an SMATV-only trade association might not have the same, combined objectives as SPACE. Recent press reports would substantiate that since the rival group's leaders have taken to attacking SPACE as 'backyard pirates,' it was a fear that this type of unqualified rock throwing might develop that caused Brown and SPACE prexy Tom Humphries to meet early this summer with the new group, to attempt to talk them into becoming a part of the SPACE operation. Those talks failed, and a Brown plan to create separate Boards of Directors (overseen by a Board of Governors), drawn up to attract the SMATV mavericks into SPACE, was the residue of those negotiations the SPACE Board was faced with in Omaha.

It became clear in the Board meeting that the rival SMATV faction is (1) largely populated by people who have fled the high rolling cable TV industry, in search of quick dollars skimmed off the top of lucrative future cable franchises, and, (2) not about to align itself with any group that includes individual, backyard users.

It also became clear that SMATV, as SPACE people construe it, is far more than 'cream skimming' the top off of cable franchise situations. The problem faced by the SPACE board, then, became one of dealing with a new, infant SMATV industry populated largely by SPACE dealers (or people who **should be** SPACE dealer members).

In a marathon SPACE Board meeting that did not gavel itself out of existence until 1:30 AM on the 6th, the SPACE Board wrestled with undoing Brown's original three-separate-boards and still providing adequate representation for the dealers, and the SMATV crowd. The decision of the Board, subject to perhaps additional study and fine tuning, was to create a 16 man board consisting of 9 Pioneer members, 4 Dealer (division) members, 2 SMATV (division) members and one 'at-large' member. In effect, the present largely Pioneer consti-



DOUG DEHNERT shows off his new top of the line, high performance three piece system from United Satellite Systems.

tuted Board of 16 **gave up** six of its own seats to make room for the specific seats of dealers and SMATV'ers. And while that **was** the decision of the Board on this issue, a plan put forward by Andy Hatfield of AVCOM to **enlarge** the Board to make room for the additional interest groups was not dead as we went to press.

The issue of how many seats would be on the Board is not as trivial as it may appear. The SPACE Board meets no fewer than three and perhaps as often as five times per year. With three-a-year shows, roughly spread out in four month increments, gathering a quorum for a Board meeting has not proved to be a problem. However, with greatly increased threats from the courts, from state and federal legislation, and from other groups such as the rival SMATV faction, it is probable that the frequency of Board meetings will increase in the next year. And getting a quorum, at Board meetings held **not concurrent** with industry trade shows, can be difficult.

Plus, there is the simple numerical problem of having enough seats for all of the good men (or women) who might wish to serve SPACE. A **desire** to serve, even with the present Board, is hardly enough to place a person onto the Board. There are presently far more people who would **like to serve** than there are seats available. Many of the 'younger' (or newer) industry participants who want to play an active part in the operations and directions of SPACE are faced with a very low turn over of Board members, resulting in very few vacancies year to year. From the first SPACE Board which was literally 'drafted' to stand up for SPACE at the San Jose gathering in July of 1980, to the present, there have been some welcome changes in this department!

One year ago SPACE was facing both disastrous legislation and severe financial problems. The trade association needed no less than \$20,000 a month to function effectively and those funds were not forthcoming. To fill that void, SPACE created something called

'SPACE Pioneers'; a group of firms that sign up to support SPACE to the tune of \$300 per month. There are now more than 30 such 'Pioneers' and that accounts for about half of the **'basic budget'** at the present time. More recently, SPACE Dealer Members have been added, with an **annual** fee to SPACE of \$300. Approximately 300 such members are now enrolled and several of the Board members, such as Bud Ross of Birdview Communications, believe that the dealer division or group will continue to grow at a rate of 100 plus per month during the next year. So while funds are not an immediate problem with SPACE, those first 18 months of life during which there were no funds available and legislative battles were fought with pennies rather than the required dollars, are still vivid in Director minds.

The proof of what SPACE funds and SPACE people are capable of accomplishing was brought home by VP Brown when he reported on the recent SPACE success in dealing with the so-called 'Goldwater Bill' (S.2172). As has been reported in **CSD** over the past several months, Senator Barry Goldwater of Arizona is attempting to get through the Senate a major re-write of the now tattered Communications Act of 1934. One of the proposed revisions was called Section 705. This section would have made it **illegal** to own and operate a private (home) TVRO in the manner which most are used. It also would have established severe criminal and civil penalties for violation of the section. The genesis of Section 705 was another Bill under study over in the House of Representatives; the so-called 'Waxman Bill.' Congressman Waxman, under political pressures from HBO and others of that ilk, is proposing nearly identical penalties for 'unauthorized viewing.' And although the Waxman bill has been before Congress longer than the Goldwater bill, it has been bogged down in procedures in the House of late.

Brown was able to report that just a week prior to the SPACE gathering, **Section 705 was deleted** from the proposed bill. It was no shallow or inappropriate victory since SPACE alone was lobbying for removal of that section. Through a combination of dozens of personal visits by SPACE's Washington staff, to Senators and their aides, hundreds of follow-up telephone calls, the testifying before hearings of SPACE Counsel Brown, and, the flood of telegrams and letters directed at the Senate from SPACE members and TVRO home users (all coordinated by Brown and his staff), the 'signal piracy provision' of 705 was dropped at the Committee level.

All is not, of course, over. There is a full Senate vote on the bill (where, in amendment form, the bill **could be** modified in any number of ways) ahead, plus the ongoing threat posed by the original Waxman bill, from which the Section 705 nonsense originated. For the moment, in Omaha, SPACE's first annual trade show was experiencing a 'heady high' based upon their recent victory, and it contributed to the upbeat feelings which permeated the show.

The equipment on hand was largely totally redone from the most recent STTI show. A full review of everything on hand is out of the question, because of the sheer volume of 'new.' Trends, however, can be addressed and we will do that in the **October** issue of **CSD**. Suffice to note at this point that the influence of Japanese manu-



OMAHA '82 ala SPACE.

facturing capabilities is **just now** really coming on line, and while many of the orient-produced products seen in Omaha were in Omaha because US suppliers had **gone to Japan** for design and production assistance, the **direct entry** of Japanese producers is now more imminent than ever.

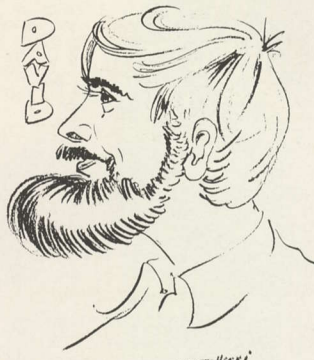
Pricing in all but the antenna areas continued to erode. The nucleus for another LNA price drop was on hand, but not offered. 50 dB gain, 120 degree LNAs produced totally in Japan and landed in the hands of stateside distributors for under \$125 each were **quietly** passed around. Full LNC/demodulator receiver packages also produced in Japan, and landed in the hands of US distributors, were also shown off quietly in Holiday Inn suites. The price? Under \$300. **KLM**, to show that not all of this low-cost technology must come from

Japan, displayed on the floor the SkyEye V; a complete down converter and demodulator (receiver) package for under \$400 distributor cost.

Not all of the Japan produced product being shown is low end priced either. Doug Dehnert's **United Satellite Systems** was proudly displaying a new 3-piece package aimed at the top end market which had so many features that virtually no presently available option conceivable was missing. Dehnert had worked on the design and packaging for nearly a year, taking it to Japan where he found the necessary production efficiencies to be able to bring the system back into the states at a price comparable to or below other top-of-the-line US semi pro and professional products. We'll look at more of this in the October issue.

DAVID'S TVRO NOTES

by
David Barker
GHz Engineering



This issue's treatment will continue on the subject of dispersal energy removal problems. Perhaps the **real problem** is in getting the FCC to **remove** the dispersal requirement! It is almost totally absurd to think that a land link with a 50 dB CNR could experience interference from a five or 8.5 watt transmitter located more than 23,000 miles out in space. It is a major task, using large dishes and a high quality LNA, to achieve a 15 dB CNR on TVRO systems. It seems reasonable to assume that land link to land link terrestrial interference is going to occur far more frequently than space to land link interference.

Since there is a 10 MHz offset between the land link frequencies and the satellite frequencies, any effort to keep the two sets of signals close to the offset would produce the least amount of interference. Adding the dispersal waveform gives no additional video or audio information to the satellite signal, and pushes more of the satellite carrier power closer to the offset land link frequencies. Most of the power from a normal satellite transmission is within $\pm 1-7.5$ MHz of the carrier frequency, and there seems no good reason to widen it more with the dispersal waveform.

The case of no modulation, and a CW signal from the satellite causing interference is the most absurd of all. Even though a signal is spread by the dispersal waveform energy, the power is still present and if it can cause interference on the 10 MHz offset terrestrial link, it can only get worse as it moves closer to the passband on the land link receiver. In the worst case, if the satellite signal deviation is ± 10 MHz, for the dispersal signal, this would move the CW carrier down right on top of the land link frequencies. With the low modulating frequency of the dispersal signal, the satellite signal would be in the passband of the land link receiver for a period of time sufficient to cause quite a bit of damage; especially if the link was transmitting high speed data.

I know of three ways of removing the dispersal energy waveform from the video. The first method is to track-out the waveform with one of the local oscillators in the TVRO receiver. This would probably be the best system of all, but it is by far the toughest to do. If the IF amplifiers and bandpass filters do not have an idealized response curve, they can cause the dispersal energy waveform and the video waveform to be mixed. Also, video amplifiers can mix the two waveforms together before the dispersal is removed. So, if the dispersal

energy is removed **before** the IFs, the mixing cannot occur there, or after. The video signal rides on top of the dispersal signal; they are added together, not mixed. Mixing the signals creates new signals, like the sum and difference signals found in mixer stages.

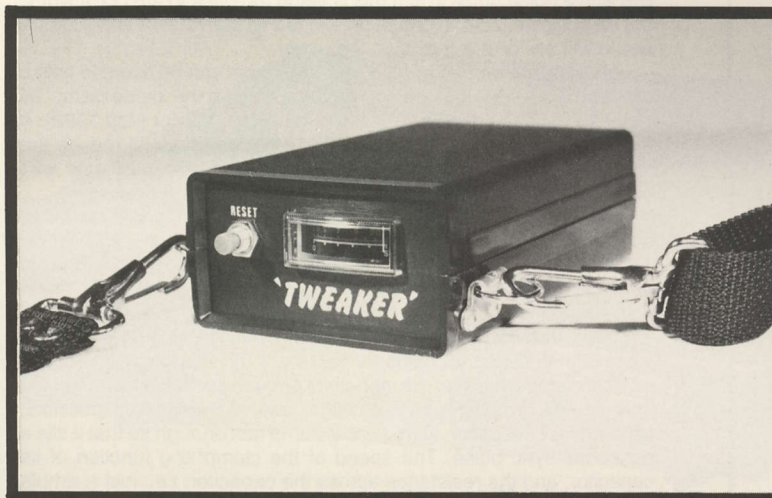
To track the dispersal energy out with a local oscillator in the receiver, a 30 Hz triangular waveform must be generated. Since the dispersal varies from none to a great deal on some transponders, a fixed waveform cannot be used(*). Therefore it is necessary to sample the incoming signal and generate a waveform to be fed back to the LO. Since the dispersal frequency is the same as one of the video frequencies, a simple RC filter will not work to trap out the signal. In fact, trying to use a simple RC filter will have the same bad effects that clamping causes, only worse.

One method that can be used to generate the LO tracking signal is to use a sample and hold circuit on the video signal. After each horizontal sync pulse, a sampling circuit turns on and measures the blanking interval present; and holds that sample until the next sample comes along. If the blanking level is changing due to the dispersal waveform, then the output of the sample and hold circuit will vary along with the waveform. All one now needs to do is to filter, and amplify, and adjust to the proper phase this waveform. Then it can be sent back to the LO to cancel the dispersal waveform. At least two of the receivers available do some LO tracking to **reduce** the dispersal energy prior to the 70 MHz IF.

Since the LO is now moving at (something approximating) a 30 Hz rate, any interference signals are now moving back and forth in the IF also at a 30 Hz rate. We now have energy dispersal waveforms on the terrestrial interference signals as well, making it necessary to widen any traps used to notch out the interference that appears (after conversions) at 60 or 80 MHz. This is not good, so if interference is a

*—The FCC established a particular amount and format for the energy dispersal or 'dithering' waveform prior to the start-up of US domestic satellite service. However, FCC policing of the energy dispersal standard has been lax to non-existent and some services (such as WGN) have operated for quite some time with no dispersal at all. —COOP

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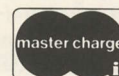
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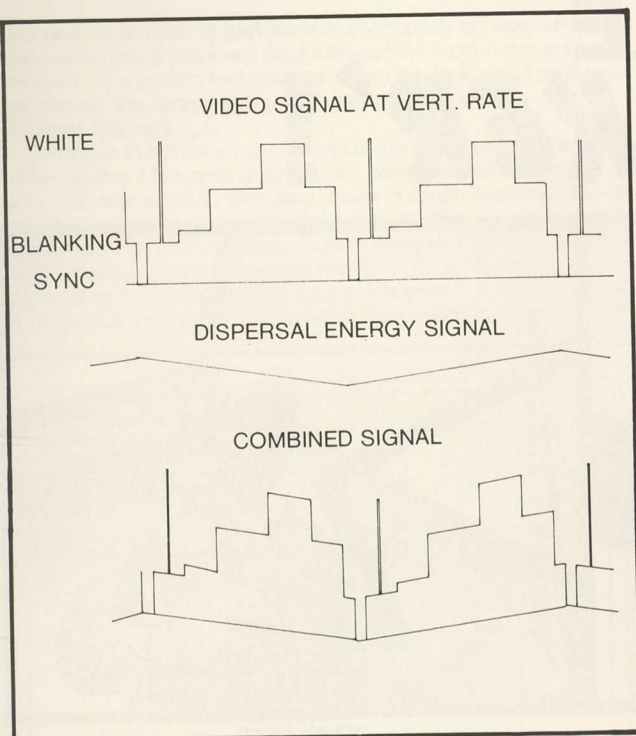
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* The **'TWEAKER'** is an electronic metering device that plugs into any receiver or downconverter operating at 70 mhz. Features include variable gain control, push button meter reset, and enough sensitivity to actually "see" satellite variability. Deluxe neck strap, manuals, and 10 feet of cable included.



problem, an LO tracking receiver should have the LO tracking (or AFC) disabled in the receiver.

Now rather than sending the sample and hold output all of the way back to a remote mixer, you could also feed it into a video amplifier (at the correct phase), along with the combined video signal. This will

cancel the dispersal waveform at that point. This technique is employed by many receiver manufacturers in the 'commercial' world.

The problem I see most often in the 'commercial' grade receivers is the response to a noise pulse during blanking. If a noise pulse comes along during the (brief) sample period, it moves the sampled blanking level greatly and causes a faulty sample. This bad sample is averaged into the generated 30 Hz waveform and causes **several** of the video picture **lines** to be shifted in level; rather than just the one line with a noise pulse in it. If this is being fed back to the LO, it would not be sufficient shift to cause an AM to FM conversion in a wide IF. But, it will still give a 'glitch' in the video.

All of the above circuits and their problems can be avoided with a one cent diode. However, there is a problem with the 'diode clamp' as well; distortion of the vertical sync pulse (see **CSD** for May 1982). A three volt peak to peak video level at the clamp should reduce the distortion sufficiently that the clamp will not cause problems with projection TV sets or VCRs, connected to the home system.

To further explain where the 3 dB figure came from; if the video output amplifier is to present a 75 ohm output impedance, and deliver 1 volt peak to peak into a 75 ohm load, it must produce 2 volts peak to peak when no load is connected to the video output terminals. If the output stage is an emitter follower, with the clamp circuit at the base of the transistor, then the clamp is running with a 2 volt peak to peak video signal. Going to 3 volts is about a 3 dB change.

The clamp circuit can be made fast enough so that a noise impulse only causes problems with a single line of video. It is possible, although not desirable, to make the clamp fast enough so that it tilts a horizontal sync pulse. The speed of the clamp is a function of its capacitor, and the resistance across the capacitor; i.e., just a simple RC time constant circuit. Many people discuss clamping as if you were clamping the vertical sync pulse. However, if that was really the case, very little dispersal energy would be removed and the glitches caused by impulse noise would be quite objectionable. In actual practice, each horizontal sync pulse is clamped to the reference level.

This series will continue in **CSD**.

ONE APPROACH TO KNOWING WHERE YOUR ANTENNA IS!

COOP'S NOTE: This is the first article appearing in **CSD** submitted by a reader in our 1982 TVRO Writing Competition. From those articles selected through and including the December 1982 issue, readers will select a 'best' article and the writer of that article will be awarded a week-long visit for two to Providenciales by **CSD**. If you have an article or idea, and you'd like a shot at a fine wintertime vacation in the Turks and Caicos Islands, time is running out to get your article into **CSD**. Full details are available from Carol Graba at **CSD**. This article describes a do-it-yourself antenna control and mon-

itoring system which constructors can create and install, on their own dish antennas, to improve the usefulness of the home system. Concepts are those of the writer and **CSD** makes no statements as to proprietary rights that may or may not be associated with the concept and circuits shown. Builders interested in learning more about the system described should communicate directly with Lionel Fortier, with a courtesy copy (CC) to Coop at **CSD**.

With this antenna control box you will be able to do the following with your dish antenna:

- 1) Control an induction/repulsion motor which can be used to drive your dish through the geostationary orbit arc.
- 2) Control any common TV antenna rotator, for selection of polarization.
- 3) Indicate for you whether you are in a vertical, or horizontal, polarization alignment with your feed.
- 4) Indicate the dish heading, to a specific selected satellite.

The particular dish format controller format described is for up to seven separate satellites. However, as many as ten can be 'indicated' from the circuit shown since the 'chip device' selected for the indicator circuit will handle up to ten indicator LEDs (or satellite locations). All parts selected are common and can be located at outlets such as **Radio Shack**. The motors shown are from 'junk boxes' and if you will prowl around local electric motor shops, you will find motors which will handle the requirements shown here, for just a few dollars each. There is this warning: most suburban and urban areas have local electrical codes to protect you and your neighbors from coming into contact with 'dangerous' electrical voltages operating in an exposed area. The box and system described may not meet your local electrical codes, and you are advised to check your local code before making elaborate plans to run controlling voltages into your yard!

Drive Motor

In the drive motor control section, you control the start and run

by
Lionel P. Fortier, Jr. (KIZEK)
248 Chesterfield Rd.
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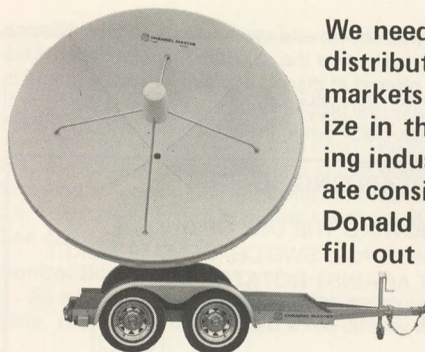
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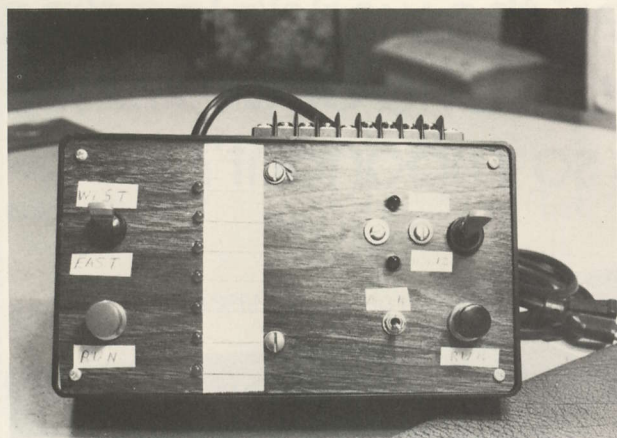
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windings on your drive motor(s). First be sure that your selected motor has a centrifugal switch in the start winding. Take the two sets of windings and connect them to the 115 VAC motor control plug (P1) on the control box. At this plug we have 115 VAC at pins 2 and 6. These two pins go to the run windings of the motor. Note that there is also 115 VAC at pins 1 and 5, reversible by the front panel east and west switch. This makes the motor run in either a clockwise (CW) or counterclockwise (CCW) direction. The particular motor I selected for my own system came out of a clothes dryer, from a surplus yard. I have this installed on my polar mount, and if your antenna is an Az-El mount (as in azimuth over elevation), you will need a pair of motors, and will also need to build a pair of motor control functions into your control box.

Polarizing Motor

I elected to use the well known and universally available Alliance U-100 TV antenna rotor system for the selection of polarization. This rotor is well built, often offered at discount prices by retailers, and is easy to work with. The only real problem with the system is the control box that goes 'clack-clack-clack' when the rotor turns. At 3 AM, it will

probably wake up the whole house!

Polarizing Circuit

The controls have been simplified by using a 'soft sounding' toggle switch to select between horizontal and vertical polarizations. This switch controls the motor's direction, which in turn allows you to rotate the feed between the two 'poles' as well as stop in between. A push-button spring-return to "off" is used to run the rotator.

Now we need a way to know whether we are in a vertical, or a horizontal, mode. Two low cost LEDs (light emitting diodes) do this for us. One lights when you reach the vertical position; the other lights in the horizontal position. You can stop the rotation before (or after) you reach either so that you can fine-tune for polarization shifts that do creep in as you cross along the geostationary belt. The switch or bat handle tells you which direction you are moving towards, and the LED tells you when you are there. There is no 'limiting' and the system is simplistic to use.

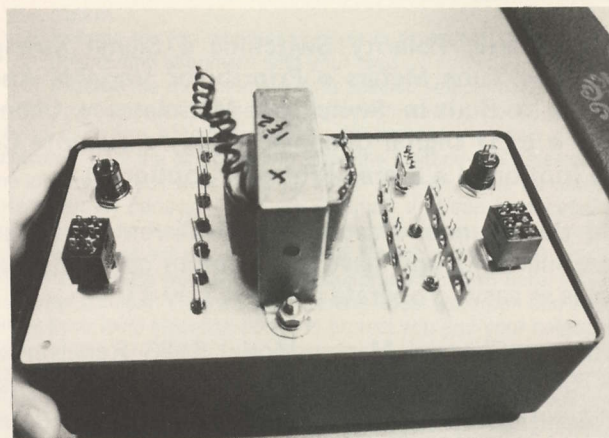
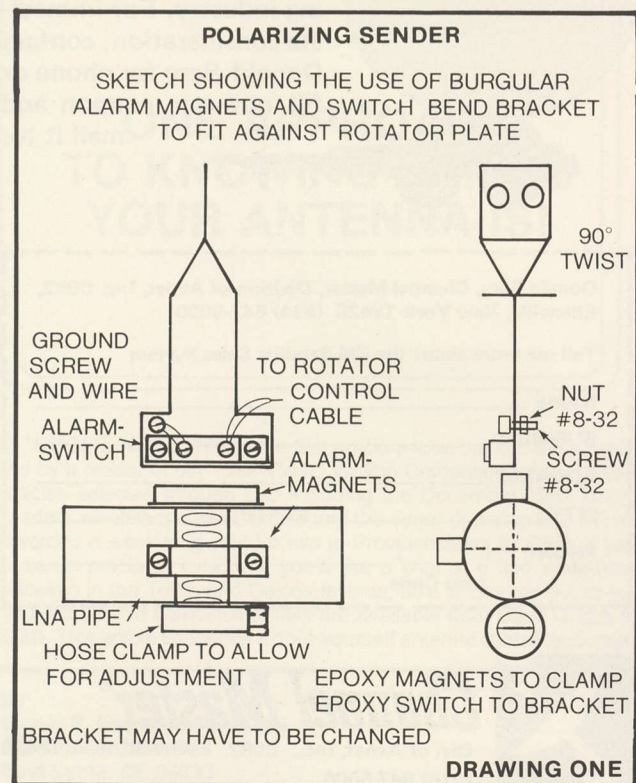
Polarization Sender

The polarization sender has been designed so as to not limit the travel of the rotator (other than the natural 370 degree mechanical stops built into the rotor proper). There is this caution; if you align your polarization (i.e. LNA probe) so that you are causing one of the two polarizations (such as vertical) to appear when the rotor is in the half rotation (corresponds to due south on the original control box) position, then your opposite pole will appear 90 degrees of rotation away. On the original control box, this would appear at 'east' and 'west.' This gives you excess room between west and north, and east and north, to allow for gradual rotor drift and aging. On the control system all we do is lift wire number four (connector to the rotor control box terminal number 4) and run it to our new control box vertical/horizontal sender (see drawing number one).

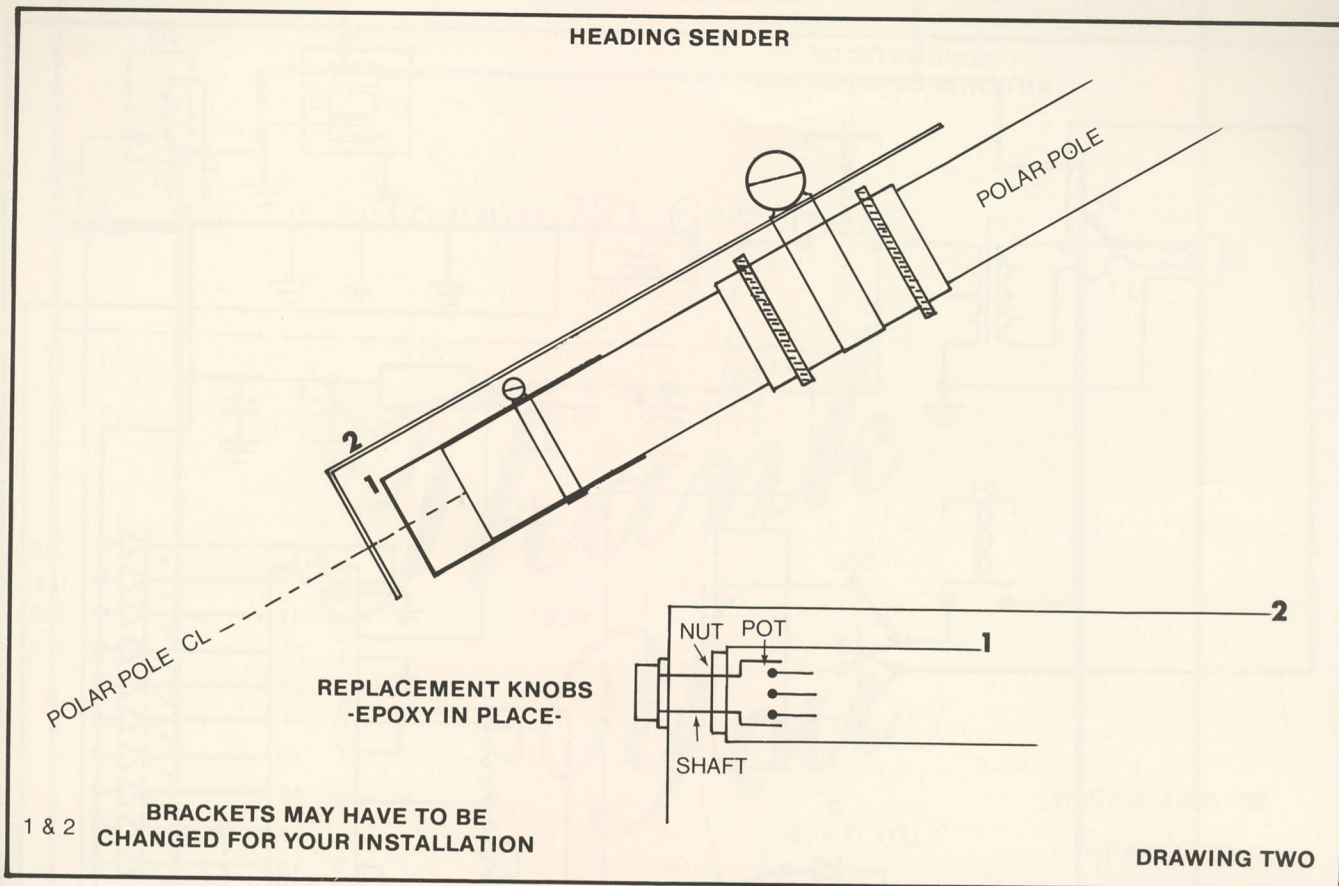
Heading Circuit

I elected to use the LM1432N LED driver IC with separate LEDs to indicate the antenna heading. This circuit has been constructed on a small piece of perf(orated) board, commonly available at Radio Shack and other parts houses.

AC voltage is 'borrowed' from the rotator transformer located inside the control box for the U-100. To operate the system, you create a DC voltage by half-wave rectifying the rotator-available AC. The driver circuit shown is the 'standard' (i.e. recommended) circuit used with this particular chip. The power supply creates 12 volts, and 5 volts; a 5 volt regulator supplies the LED units and the chip. The chip has a 0-5 VDC input (pin 5) and the 5 volt lead plus a ground lead come to the terminal strip located on the rear of the container. The pin 5, plus 5 volts, plus ground terminals travel through the terminal strip to the 'sender' or antenna heading unit, located at the antenna. As the mount moves, so does the sender unit which in turn changes the voltage on the 0-5 volt DC lead. As this voltage changes in approximately 0.5 (1/2) volt increments, the chip 'steps' to the next LED in



CONTROL BOX / aluminum top (cover) plate reversed to show location of parts for system.



line. As noted, the chip is capable of running up to ten LEDs, which would correspond to ten separate satellite locations. The same chip can also drive a 'light bar' device, or you can cascade two or more of these chips to operate larger quantities of the LEDs to indicate more than ten separate satellite locations.

Since this is a custom-to-each installation project, I elected to print or use a Dymo Tape Writer to label the LEDs as to either their family name (i.e. W5), or, for their geostationary location (i.e. 123.5).

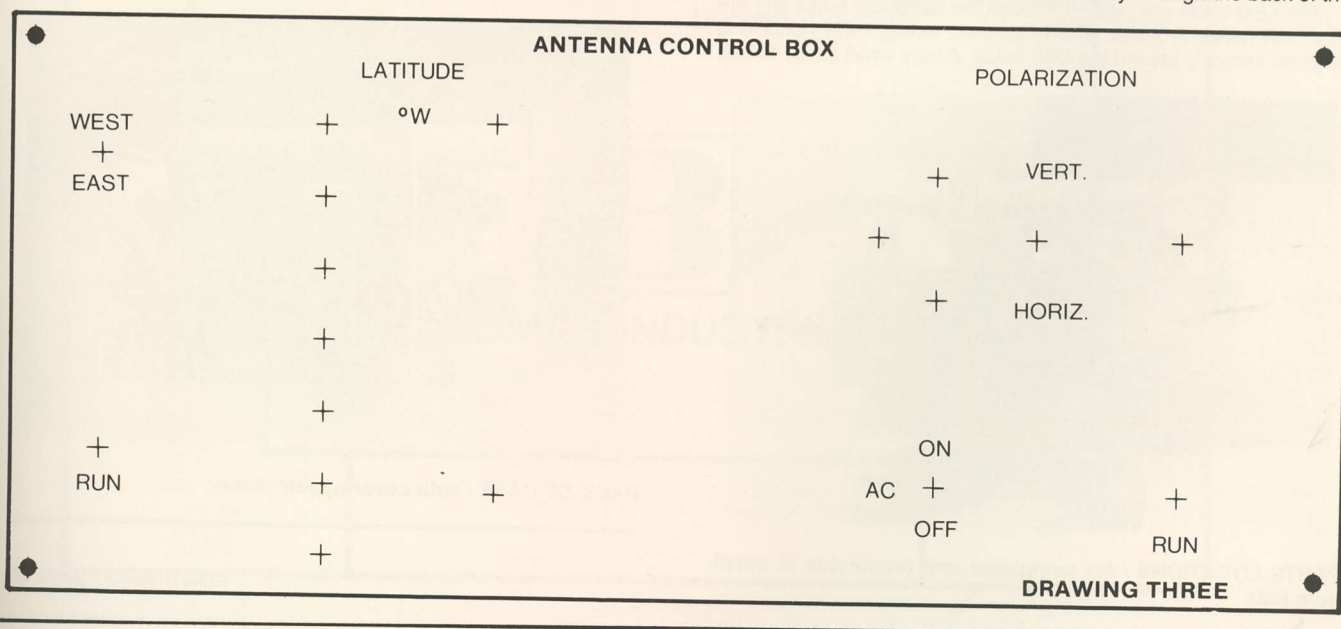
Heading Sender

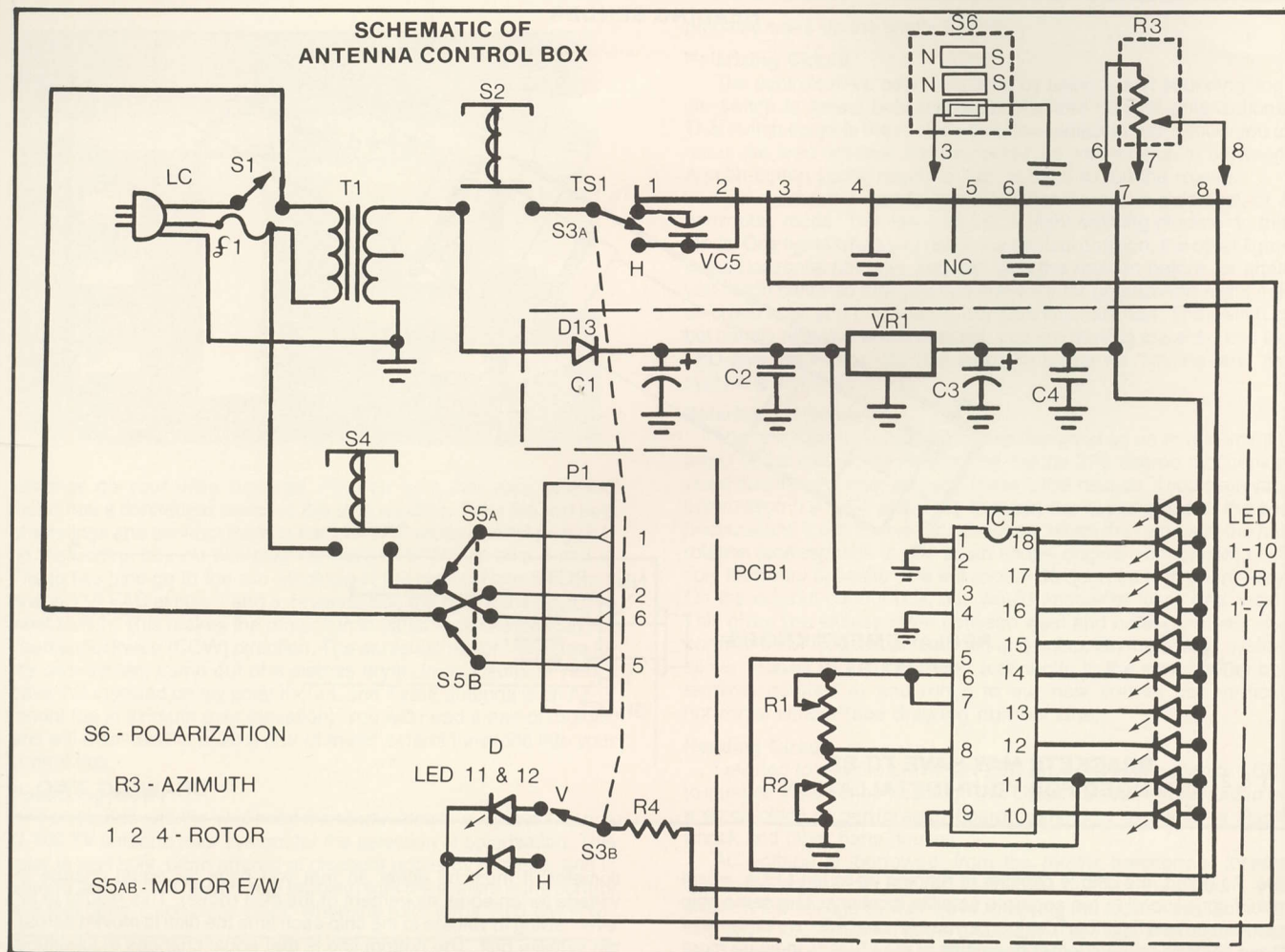
The heading sender consists of a 5K (5,000) ohm linear poten-

tiometer. It must be linear so that you have an equal change in voltage for an equal movement of the dish (drive). This results in an 'even' swing in voltage to the chip each time the dish is moved across the satellite belt. The bottom line is that equal changes in longitude (degrees of heading) will track with the linear changes in the electronics. This means the LEDs will track with equal movement of the dish. **See drawing two.**

Control Box/Layout

All switches and the transformer are mounted on the box cover plate. The AC line cord is hard wired directly through the back of the

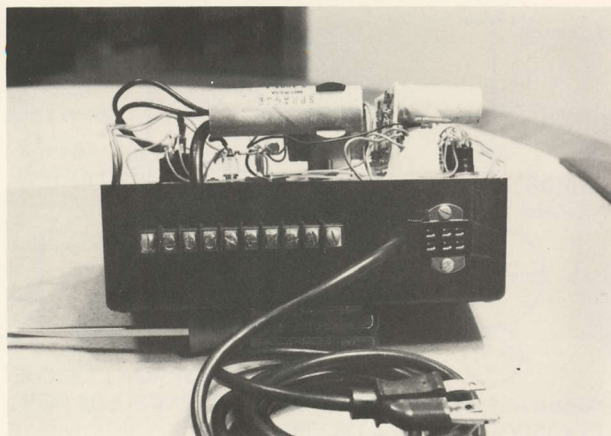




container. All low voltage connections are made with feedthrough barrier strip connections on the rear of the container. The 'high voltage' connection (115 VAC) for the heading motor is done by a heavy duty multi-conductor connector; P1.

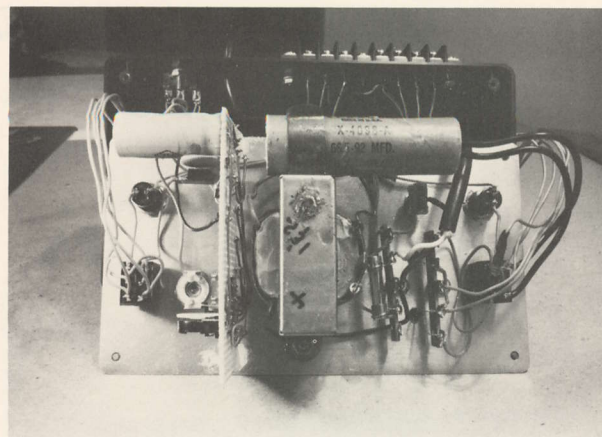
LED Board

The LED leads are pushed through the perfboard holes and are then bent over. A small wire is pushed through the holes and wrapped securely around the LED leads. A very small dot of solder,



PARTS LOCATIONS / for completed unit (underside of aluminum top).

and the LEDs are mounted nicely to the edge of the perfboard. A small drop of rubber cement or sealant on a couple of the LEDs will hold them **and the LED board** to the panel proper. The vertical and horizontal indication LEDs are held in place by their leads which are soldered to a tie-down terminal strip.



BACK OF CASE / with cover upside down.

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You*

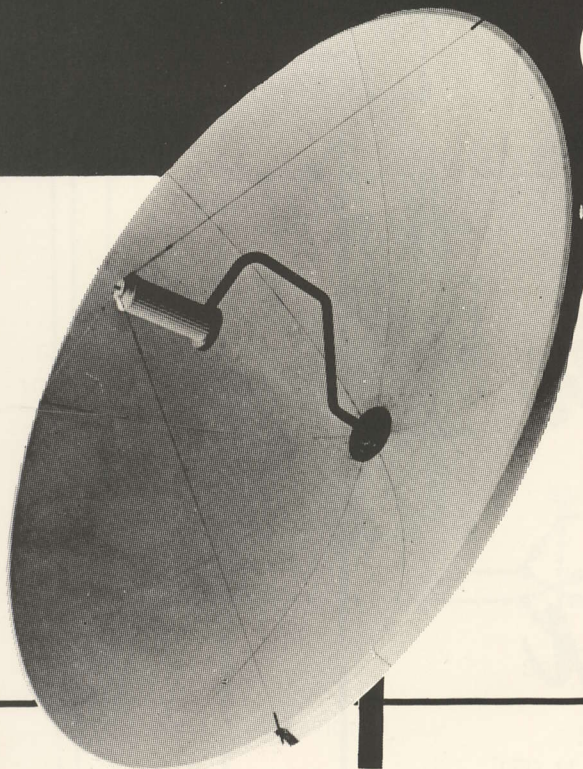
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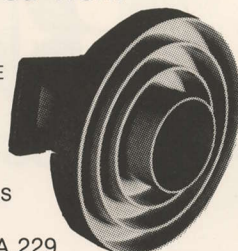
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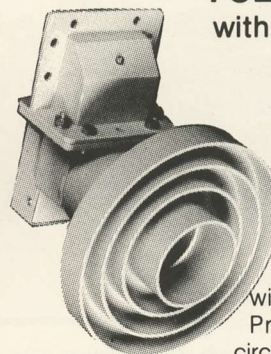


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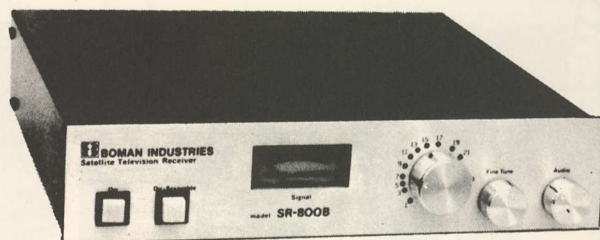


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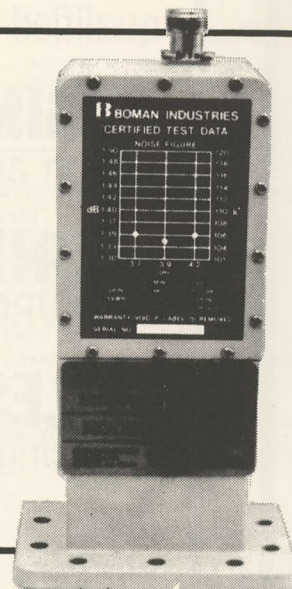
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The face of the control box comes with an aluminum cover. You can go for the natural aluminum 'look,' or cover it with a small piece of woodgrain contact paper. This gives it more of a professional look and your wife may be more anxious to have your creation in the living room if it doesn't look like part of a Ham radio station! See drawing three.

Heading Calibration

The only electrical adjustments are variable resistors R1, R2 and R3, and, S6. See parts list. All other adjustments are mechanical.

After the unit is assembled and you have carefully gone back over it to see if you soldered all of the connections properly (a high percentage of electronic projects don't perk when turned on simply because of poor soldering techniques!), connect the heading sender (containing R3) to the main unit. Apply power and using a decent quality digital voltmeter check for voltage on the wiper lead of R3. Adjust R3 for 5.0 volts DC. When you have five volts, the adjustment should be all of the way to one end of the rotation range. Now adjust R1 so that LED number 10 (one end of the antenna rotation field) is 'on.' No other LED should be on. That is all there is to the electrical set up adjustments.

Next, attach your sender to the antenna and remember that R3 has been set for **one end** of the range or the other; i.e. the furthest bird east, or west, for you. You may wish to have this LED indicate F4 (most easterly bird of interest to most of us), which then means that your highest LED drive(r) voltage is corresponding to the most eastern part of your sky. F3R will, then, be at the opposite end of the LED train. You will want to keep this in mind when you attach the sender to the antenna, since the antenna will have to be aligned in advance with the antenna heading itself. If you decide to change this sequence, you can switch the 5 VDC and the ground leads for R3 on TS1.

By setting the sender up electro-mechanically with LED number 10 on, and the dish looking at a bird at one end (F4 at 83 west suggested here although it could also be F3R at 132 west), you will now have a 'reference point' to start marking the balance of the LEDs for specific bird locations. This can be done very accurately by knowing precisely how long it takes your dish to move 4 degrees; or, from one bird to another bird, in the sky. By knowing how many seconds it takes for the dish to travel 1 (or 4) degree(s), you can count off the seconds from your first reference point and tell exactly where the dish is when the next LED comes on. This can then be done with each of the 7 (10) LED indicators.

Polarization Calibration

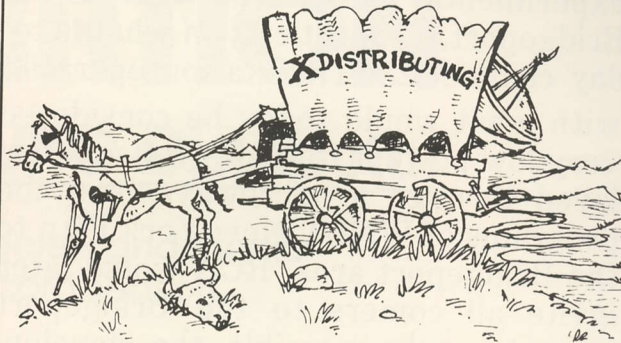
After installing the switch plate, slip the hose clamp with the magnets over the pipe. Set the LNA for the best vertical picture and/or indicated signal level if your receiver has a meter. Rotate the clamp so one of the switches is in line with the magnet. Which switch will depend upon whether you are electing to go clockwise (CW) or counterclockwise (CCW) to move the feed to horizontal polarization. Check to see that the switch is closed. Now rotate the rotor motor so you have peaked on a horizontally polarized signal, and check to see that this (second) switch is closed. The sensitivity of the system depends upon the size, and positioning, of the magnet.

And that is all there is to it. It is hoped that other do-it-yourselfers in the field will use and improve upon this basic system, and share their experiences with not only the author directly but with other enthusiasts here in the pages of **CSD**! Thanks to Ellen N. Fortier for assistance with the photography, and Bill Konrad (KITUK) for assistance with the power supply.

PARTS LIST

LC	6 foot, 3 wire line cord
f1	depends upon the type of (surplus) motor utilized.
	Glass type with wire leads soldered to end caps.
S1	SPST toggle (sub-miniature)
T1	Power transformer (from U-100 control box)
S2, 4	SPST normally open, momentary contact
S3, 5	DPDT heavy duty lever switch
P1	Chassis mount connector, heavy duty
TS1	Feedthrough barrier strip (8 terminals)
C5	Rotor starting capacitor (from control box)

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S6	Magnetic reed switch (check for burglar alarm magnet switch at Radio Shack)
R3	5K ohm (5000 ohm) linear taper potentiometer, typically 1-11/16 inch long by 1/4" diameter shaft
R4	270 ohm, 1/4 watt, 5% carbon resistor
LED 11, 12	Red LED, T1-3/4 size
Box	Experimenter box, Radio Shack RS-270-232 with plastic case, aluminum cover (7-3/4" x 4-3/8" x 2-3/8").

LED BOARD / PARTS LIST

PCB	Perfboard, IC spacing type
D1-7	Red LED, T1-34 size
D13	Rectifier, 1N4003
C1	1000 uf at 35 WVDC
C2, 4	0.1 UF ceramic disc
C3	4.7 uf at 35 WVDC
LC1	LM3914N LED bar/dot display driver and 18 pin dip socket.
R1	1K (1000) ohm printed circuit potentiometer
R2	5K (5000) ohm printed circuit potentiometer
VR1	Voltage regulator, IC7805 (5VDC)

ABOUT THIS SERIES—

Starting with the August 1982 issue of **CSD**, we began a series which is re-printing a long-out-of-print analysis of the early development of television broadcasting in the United States. This series, originally researched and published by Bob Cooper in the pages of **CATJ** magazine, established 'the record' for a Congress and FCC which was, in 1975, planning to **increase** the regulation of cable television (vis-a-vis television broadcasters). The original series is said to have had some measure of success in getting the FCC to relook at CATV regulation, the end result of which turned out to be far less rather than far more regulation for cable. We are consuming valuable **CSD** page space with this series for one reason; **those new**

to the TVRO industry cannot grasp the significance of today's events without some tutoring in the early history of FCC handling of television broadcasting in this country.

In the summer of 1949 RCA put an experimental station on the air in Bridgeport, Connecticut, on what is today channel 23. The station operated with what would today be considered very low power (15 kilowatts), and relayed through a microwave feed the programs of WNBC New York City to the Bridgeport area. RCA would later invite all comers to the Bridgeport tests to make possible the development of UHF receiving antennas, UHF converters, tuners and the like. Of course in the process of running the tests, RCA gained valuable first hand knowledge that would apply to the later manufacture of television transmitters for UHF.

With the UHF question under study, the Chairman of the Commission wast-

THE ROOTS OF TVRO (Part 2)

ed no time sowing seeds of encouragement to the disgruntled, freeze-bound, industry:

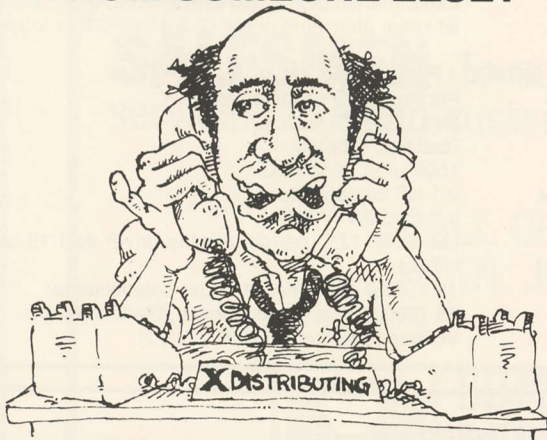
"Within the next few years, there will be close to 1,000 television stations reaching a large percentage of the population of this country. In that same period this country will have 25,000,000 television receivers."

Of course the business of predictions was risky. *Today* there are *not yet* 1,000 television stations yet on the air; however, in early November of 1953, the 25,000,000th television receiver would be bought by the public.

It might be well, while we have the Commission temporarily off the hook in mid-1949, to review some of the basic blunders of 1945-46 which the Commission was still trying to live with in 1949. The broadcasters of that era, already on the air telecasting, *were not above* applying subtle pressures on the Commission. As we shall see separately, their's had become a *very high* return kind of business, and they wanted to protect their new found gold mines. They were not above *spending* a few bucks to do so.

In 1945, the assignment table allocated television stations (i.e. channels) to the 158 largest trade areas in the United States. Little or no thought was given to the efficient use of these channels; they were merely scattered

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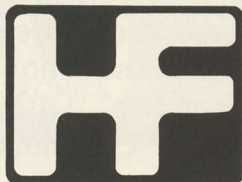
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about where they "might do the most good". When the Commission faced up to the error of its ways in 1948-49, one option it felt it did *not have* was to make any of the then existing stations uncomfortable. So a few would be asked to move up a channel or down a channel, and a few *might* even be asked to move from low band to high band (i.e. from one of the 2-6 channels to one of the 7-13 channels). But overall, the plan was to disturb the existing situation only a little bit, and *none* would eventually move to UHF.

In effect, if you left all of the 107 then operating or authorized stations in place, or moved them about only slightly, you did not have a completely new slate with which to work. In fact, as the VHF and UHF allocation table developed, it became increasingly clear that *as long as the original 107 stations stayed put*, or nearly so, there

THE ALLOCATIONS ROOT

Had the FCC gone about **their** allocations business in an orderly fashion during the 1949-52 period, the whole complexion of CATV today would have been dramatically different. **CATV exists today** because in 1975, some 23 years after the "freeze lifted", **more than 22 million U.S. homes are still not reached by the basic three network service.**

were many fewer *clean* options available to you. And, in the end, the allocations table developed *would not be a new program*, it would be an old one with appendages tacked onto it.

Some industry experts saw *through* the obvious difficulties the Commission was having with making a new plan meld in around the existing status quo, and they offered alternate suggestions. One of these was offered by Dr. Thomas T. Goldsmith, Jr., Director of Research for DuMont Labs. The DuMont plan started out with the premise that *VHF would be utilized for the largest cities*; the exact number where it would be utilized was open at the beginning of their study; they merely *ignored* the existing 107 stations that the FCC kept stumbling over and started with a clean slate. Using mileage separations between co-channel and adjacent channel assignments, which would seem adequate today, DuMont developed a plan which would allocate *4 VHF stations* (i.e. channels) *to each of the 140 largest trading areas* in the country; and then, utilizing a popular 48 channel UHF capacity (it, of course, subsequently became 70 UHF channels), DuMont illustrated how the UHF channels could be assigned for those markets that re-

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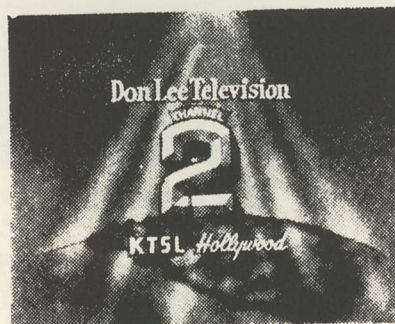
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PIONEER'S PIONEER

Don Lee Broadcasting, operator of a radio network in the West, actually began daily transmissions (1½ hours each) in mid-1931 using a frequency assignment equivalent to the old TV channel 1. A very innovative outfit, KTSL, produced many hours per day of remote telecasts throughout the Los Angeles basin in the late 40's using a 16 foot parabolic dish antenna atop their Mt. Wilson site (which they developed for television) to pick up early Rose Bowl Parade coverage shortly after World War II. KTSL was sold in 1950 to CBS, and operates today as KNXT.



quired more than 4 local outlets (i.e. New York, Chicago, Los Angeles, San Francisco, etc.); plus the UHF channels would be assigned to rural areas or markets smaller than the top 140 trading areas. The DuMont plan made excellent sense, *which is probably why it was disregarded.*

It is only fair to point out that at that

time DuMont was in the television network business. CBS and NBC were the big networks, with firmly entrenched network affiliates across the country. DuMont was operating with a handful of affiliates (less than 10 full time at the peak) and ABC was just barely operating at all. DuMont believed that the largest possible number of trade areas should have *equal exposure to all of the network services* (i.e. one each ABC, CBS, DuMont, NBC outlet). Many years later when ABC was crippled by lack of national exposure and the FCC moved VHF assignments around one last time, DuMont's 1949 thesis would be proven correct. But for DuMont that would be too late; the network folded up in 1955.

Many years beyond our present time frame in this report, in early 1954, Dr. Allen B. DuMont would appear before the FCC and make a statement that rang altogether too true. He said (in early 1954):

"The 1948 freeze reserved for two networks (CBS and NBC) the almost exclusive right to broadcast in all but 12 of the 63 market-trade areas with television at that time. Because of this situation, the other two networks (ABC, DuMont) did not have and have not had more than a ghost of an oppor-

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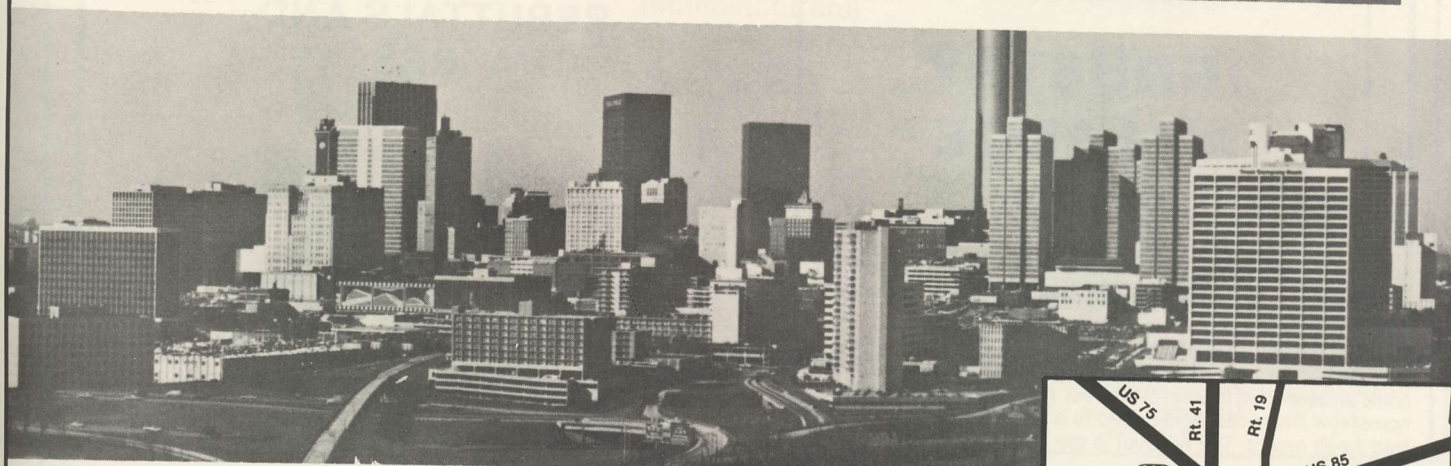
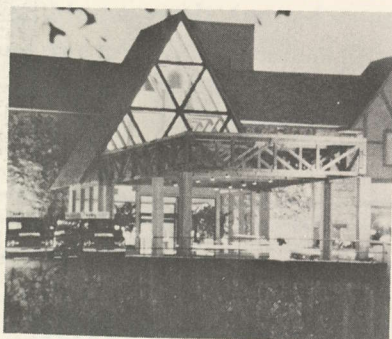
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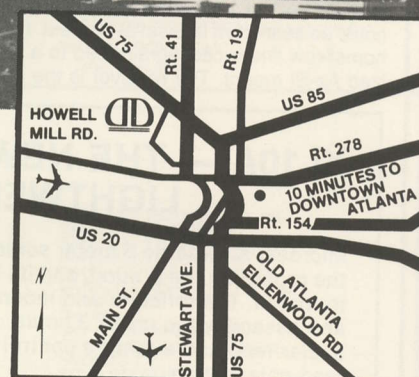
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BY POPULAR DEMAND from both registrants and exhibitors, the Ninth Satellite Television Technology Seminar / Trade Show will be held at the Dunfey-Atlanta Hotel in **Atlanta**, Georgia, on October 29, 30 and 31, 1982.

JUST AS YOU SAW at the STT Trade Show in Fort Worth in March, the **Atlanta** event (abbreviated to "SIBCO") will once again bring to one meeting place all of the leading TVRO manufacturers, distributors and dealers plus hundreds of earnest, eager businessmen wanting to enter this vital, growing business. You will see 100-plus exhibits of all the latest TVRO equipment, 60-plus satellite antennas of every description.

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tunity to get their programs into markets so necessary, if high quality programs are to be produced and attract advertisers from whom revenues and profits must come. If prompt action had been taken to establish a new allocation table and the UHF channels opened up when there were less than a million operating

television receivers (only 975,000 receivers were in use at the end of 1948, the year the freeze began), there would not have been the suppression of the 'courage and daring' of the two smaller networks."

CONTINUED / October

INDUSTRY AT LARGE

CORRESPONDENCE, NOTES, REBUTTALS AND CHARGES . . .

CSD provides this industry Forum with the understanding that opinions, thoughts and "facts" published are from the writers; no liability for statements extends to the publishers. Address letters to CSD / Industry, P. O. Box 100858, Ft. Lauderdale, FL 33310.

53 West In Arizona

After reading in CSD for July '82 about the half transponder formats and weak Intelsat EIRPs, I was curious to see if anything could be seen from Intelsat at 53 west. I am running a ten footer with a homebrew linear cassegrain feed to a 120 degree LNA on a motorized Az-El mount. The receiver is the early 564 version without the

divide by two technology. I am near the Mexican border in southeastern Arizona.

Right on station I found video on transponders 1, 4 and 5 (Intelsat IV format). They had some noise but were holding sync and color. There was English audio on the Intelsat transponder 4 (US receiver dial position 7) and Spanish on the other two at 5.8 MHz. Observation

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with an HP-8551B spectrum analyzer confirmed all three channels were using the half transponder format with video seeming to be about 10 MHz wide. As compared to the F3R levels, the signals here appeared to be about 9 dB lower in level. Based on this experience I would say that watchable pictures could be had from Intelsat throughout Mexico, Central America and the northern sections of South America with a 10 to 12 foot dish, right hand circular feed, a low C/N threshold receiver with a half transponder format demodulator.

Jack Taylor

Sierra Vista, Az. 85635

This is a 4B bird which gives it a little more punch than the older 4A birds. Lately their station keeping has improved considerably. The only area that can't see this Intelsat bird would be in the area north of a line from approximately San Francisco to Minneapolis or so. For the rest who want to see what it takes to optimize on a half transponder, circular polarized signal, go get 'em!

A Book

Enclosed is an announcement on my new book titled "**The Home Satellite TV Book: How To Put The World Into Your Backyard**". It has been published simultaneously by Playboy Books in hardback, and paperback by Worldview books. This is the first national book on the subject, written for both the satellite TV enthusiast as well as the budding satellite entrepreneur.

Anthony Terry Easton

559 Pacific Ave., Suite 32
San Francisco, Ca. 94133

Easton's new book is available for under \$11 in paperback. We read our review copy while flying back to Provo recently. Not bad, but not good either. Easton has a good grasp of the overall satellite picture but lacks in depth knowledge of the system mechanics and electronics. The book has a hard time deciding whether it is for the do-it-yourself person, or the average man in the street. Lacking that decision, it wanders from side to side never clearly defining sufficient data for either. The novice will be confused by a lack of basics; the more advanced person will wonder where the in depth stuff is. Because of the long lead time between the final proofs and publication, much of the book is clearly out of date before it hit the streets. Easton insists on calling Taylor Howard 'Ty' Howard and credits a chap named Irving Kahn with the original invention of cable television. Kahn will be delighted with that credit since he was running a movie theater in Mobile, Alabama at the time cable was developed and it was an industry more than ten years mature before he entered it. All of this aside, it is the first 'national' book on the subject and as long as you don't get too hung up on repeating what you read in the book as gospel, it is a worthwhile \$11 investment just to impress your friends that you are involved in an industry of some stature. Chances are your friends won't know that Irving Kahn did not invent CATV, nor will they know that Tay Howard is not Ty Howard.

TRANSPONDER WATCH

RECENT REPORTS OF ACTIVITY ON DOMESTIC / INTERNATIONAL SATELLITES

Send your reports to CSD Transponder Watch, P. O. Box 100858, Ft. Lauderdale, FL 33310. For late news, call (305) 771-0505.

WESTAR 5 went through now familiar start-up exercise on schedule in middle of July, dual feeding on both 4 and 5 CBS Cable, SCN and WOR. On July 26th WOR and CBS shifted totally to the new 5 bird. Preliminary reports indicate **WESTAR 5** does **not** have the signal level which **Westar 4** has displayed, even in the boresight region. Explanations for apparent lack of signal are being sought.

WESTAR 1 has finally popped up at 79 west carrying only data and SCPC traffic. Bird is not likely to carry video except under unusually heavy loading. **WESTAR 2**, still with some life left, is scheduled to join **WESTAR 1** AT 79 west as soon as the drift-back exercise is completed.

INCREASED use of **COMSTAR D3** bird for NBC (transponder 1), ABC (transponder 13) and CBS (transponder 17) feeds noted. **NBC** transmitting early day and late evening programming, primarily for eastern time zone; **ABC** transmitting central time zone feeds morning schedule, past noon; and most of full evening schedule. **CBS** transmitting morning news and evening news only. Video testing on transponder 8 also noted; no source reported.

SPECIAL events fed to Puerto Rico (i.e. Miss Universe, World Cup Soccer, others) now seems to be done primarily on transponder 20, D1/2 bird. Some use has also been made of transponder 12 for this feed.

WESTAR 3 scheduled to drop most or all video during September, with possible exception of weekend football and baseball feeds. Western Union planning to shift occasional video now found on 3 over to 4, as most of cable programming moves to **Westar 5**.

FCC did study of transponder use and bird loading and found more than 80 of the US C band domsat transponders totally un-used.

Survey has drawn responses from all bird operators with most pointing out that FCC spent average of 45 minutes on a satellite and this was primarily in mid-day period. Some transponders are in use only parts of day, and short period checks for any birds would miss much of the on-again, off-again traffic. Bird operators fear FCC study, indicating 40% of transponders were not in use at time of measurement/ checks, will come back as data to sustain growing Commission concern that there are already too many satellites authorized; no more need be at this time.

BIZNET, official satellite service of U.S. Chamber of Commerce, still scheduled to begin on F4 during October. However, plans to start interim one day per week (scrambled) service back in July were set back by more than a month, and schedule for October seems less than firm, largely because of failure by suppliers to deliver adequate hardware.

FUROR created by Canadian DBS applicants over plan to allow first ANIK C bird to be leased by American DBS firms, with southward adjustment of boresight, brought results. Now Oak (et al), who had signed up for interim use of ANIK-C, have accepted TeleSat proposal to shift US programmers to second C bird. This means Canadian DBS firms will not have to share bird, or suffer from 'lowered' boresight. OAK and other US programmers will now **not** start 12 GHz service before the middle of 1983; or later.

OFFICIAL, approved, exchange of programming between US program sources and Canadian program sources, on each-other's C band satellites, predicted to begin in first quarter of 1983. Most of approvals required have been worked out, although the terms of the two nation agreement must still float through Intelsat 'rubber stamp-

ing.' Intelsat must be 'convinced' that direct exchange of programming, without going through Intelsat, will not cause economic harm to international carrier system.

RCA remains convinced that 12 GHz DBS will fly, and says it sees market as large as 20,000,000 homes for service. RCA plans to launch satellites in service, suggests that a single program channel, on two or more birds, with spot beam coverage to all four US time zones, will lease out at about \$75,000,000 per year. Present, single, C band transponder, doing the same thing from a single bird, although at lower (weaker) EIRP levels, goes for about \$1,500,000 per year. If you had 19,999,999 'friends' who wanted to share the annual cost of renting a transponder, they would each have to chip in \$3.75 per year for 12 GHz service, or \$0.08 per year for 4 GHz service.

ON AGAIN/off again French-German pact to share DBS system is on again. Two nations have signed 1.5 billion dollar accord to

construct and launch and operate a pair of satellites with three channels each. Operation is not expected prior to 1986 (see special 12 GHz European report in this issue, **CSD**).

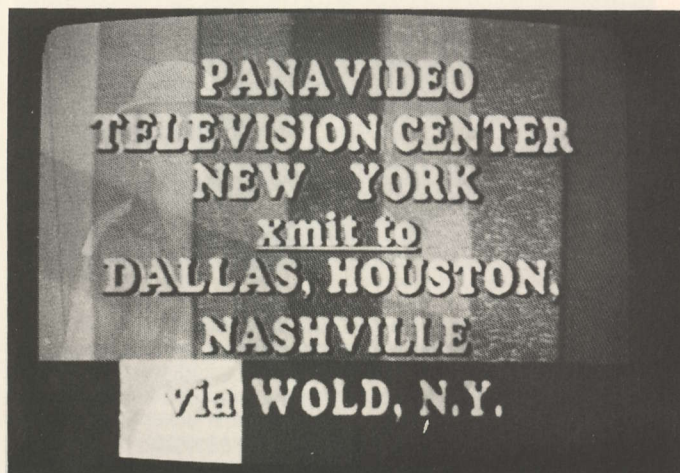
SBTS 1 and 2, the Brazilian national domestic C band birds, will be launched in February and July of 1985. Launch will be Ariane.

BLACK Entertainment Television (BET) was scheduled to begin 40 plus hour per week service this past middle of August, on Westar 5. The new service will use original material, black movies, and a series of black created quiz and talk shows to fill television day. Uplinking will be done from Washington, DC using a new Taft Broadcasting uplink, while production is being done in studios of WDCA there.

PBS feeds may one day become important satellite services for farmers. PBS now developing teletext system using decoders sold widely by Sears Roebuck for closed captioning, to allow agricultural marketing information to be transmitted in vertical interval. Earliest available date; mid to late 1983.

NEW signal levels from Westar 4 and Satcom 3R throughout Caribbean causing many equipment suppliers to re-evaluate what will work, and not work, in former 'outback' region. Given careful installation techniques, high quality, low-threshold receivers and 100 or better LNA, systems with dishes down to 10 feet are perking on at least the stronger of the transponders as far east as St. Maarten. Systems moving to 20 foot dishes and the weaker horizontal side for reasonably high quality pictures. Importance of being able to use 10-13 foot size dishes is considerable for marketing although widely varying results reported may indicate combination of equipment performance shortfalls, and, installer talent. As always, in the 'fringe areas' put in a **test** installation identical to system you intend to sell **before** you promise anything!

AIR FORCE not talking about reported use of 7.9 to 8.4 uplink and 7.25 to 7.75 downlink military satellite by 'illegal' user. One source reports military satellite was treated to unusual 'musical program' beamed through satellite by unknown uplinker. Military satellites often employ broad global receive antennas to get maximum use out of wide area coverage. Un-named bird had musical transmission



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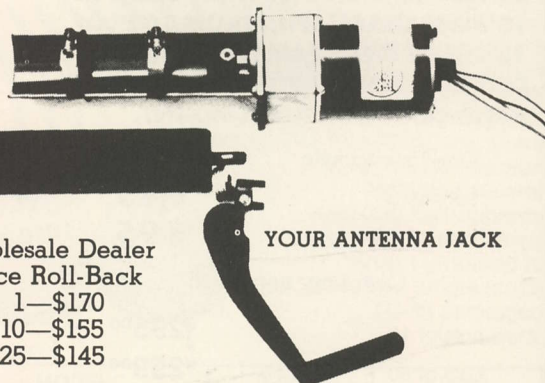
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flowing through bird long enough for air force surveillance people to spot the SCPC signal, measure it, and then try to figure out what it might be, and who might be doing it. One theory is that European STL (studio to transmitter) link, used to connect remote TV studio to transmitter site, may have had an antenna 'mis-directed' into sky and towards satellite. Given sensitivity of military satellite front ends, even a watt or two, into a four foot dish, would compute. Regardless of source, or reason, Air Force is concerned.

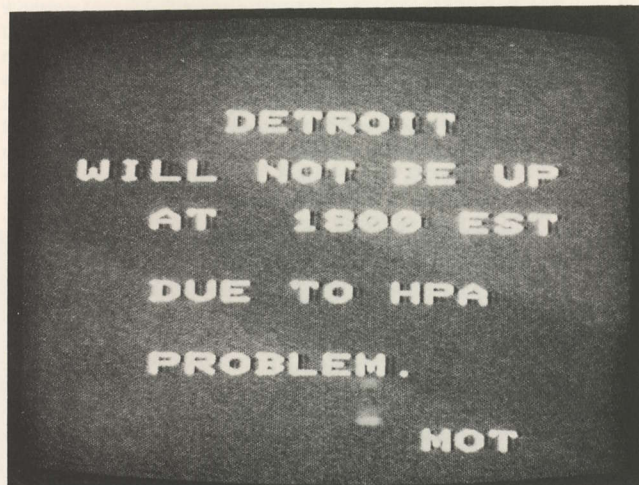
CLOSER to home, 'free-riders' using 5 watt SCPC rigs with 15 foot and under uplink antennas are getting nationwide coverage through Westar and RCA Satcom birds. Problem is made more difficult to control by frequency agile uplinks that can move around virtually undetected and slide in for an hour here and there amongst other 'authorized' SCPC signals. In most parts of US, 5 watts in 5.9 / 6.4 uplink band, single audio channel, into antennas as small as 12-13 feet will get through bird with CNR margins to spare. Most RCA and other primary station uplinks allocate far more power per carrier than this, and spectrum analysis of transponders to identify individual carriers can easily 'miss' presence of lower level signals. Proliferation of authorized 5 watt rigs now considerable, leading to ready availability of hardware for 'bootleg' terminals. It takes two to play game however; for duplex telephone circuits. Stakes are reasonably good since one on each coast can save users thousands in long distance telephone bills per month. Flat out cost for 5 watt, 4.5 meter is around \$42,500 not installed.

HEATHkit and Scientific Atlanta have introduced substantial price reductions in basic 10 foot terminal; a \$2,000 price range cut to just under \$5,000. Other comparable packages had dropped to or lower than this range more than eight months ago. They have also added 90 degree LNA package, and a second-option extender panel kit for antenna, for weak signal areas.

LANDMARK award by court against seller of MDS receiving terminals chalked up in District of Columbia. Marque HBO was awarded \$102,375 in damages in decision involving AIDA TV Sales and Service. AIDA owner William Early allegedly sold home MDS systems, installed, for \$375. Court records indicate he admitted to selling ap-

proximately 60 of the systems (value \$22,500). Suit was brought under provisions of Section 605.

TWO, separate, Rede Globo feeds on Intelsat have been noted of late; one the normal feed that has been a mainstay of Brazil for several years, the second a service seemingly dedicated to sending DEF (Direct Electronic Feeds; of news) and backup programming.



Transponder Watch

The following data tracks the changes noted in the past 30 days with the North American-visible geostationary satellites. This is not intended to be a 'program guide' as regularly scheduled services are found routinely in several publications. Rather, it is intended to help antenna installers chart new system reception capabilities and to help with the identifying of services found on an irregular basis on the many satellites visible. Like all non-scheduled feeds, changes are

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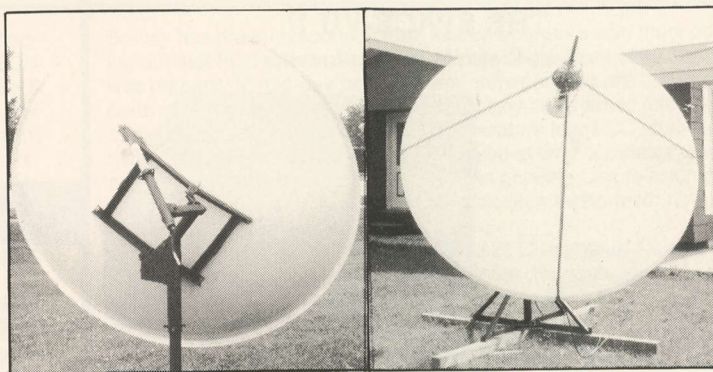
Lots of 10	\$295⁰⁰
Lots of 50	\$259⁰⁰
Lots of 100	\$225⁰⁰

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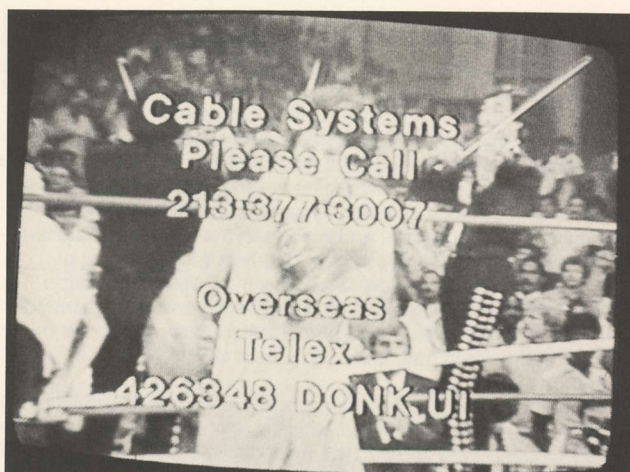
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going to occur with great regularity.

Ghorizont / 14 West — Video up almost all of the time on (US receiver) TR9 but most entertaining time to watch is from 5PM ET to 9 PM ET Friday and Saturday nights. SECAM color feeds come out in black and white on NTSC receivers, and vertical hold must be readjusted for rolling picture.

Intelsat / 24 West — Rede Globo (Brazil) feed still active (US receiver dial) TR22 in half transponder format. Level only marginal on six meter; audio strong however (5.8).

Intelsat / 29 West — ATC (Argentina) best signal level presently from an Intelsat bird, out of sparklies on six meter on TR24 in PAL-N color format with potent audio (5.8). Operating hours from approximately noon ET to 1AM ET. Full transponder format.

INTELSAT / 34 WEST — NTSC feeds with 5.8 audio (color) for various South American countries noted afternoons and evenings,

half transponder. Levels approximate those of Rede Globo.

Intelsat / 53 West — Half transponder NTSC (5.8 audio) from Mexico on (US dial) TR1 and 5; San Diego commercial US network signals continue TR7 (5.8 audio) in full transponder format.

Westar 1 / 79 West — Bird now fully operational here, will be joined by Westar 2 and as a pair they will handle only data and SCPC traffic. Signals comparable to older 99 west location.

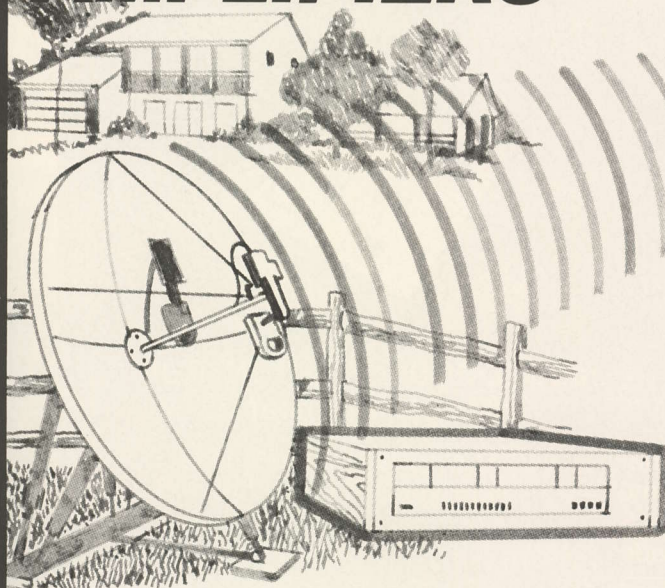
Satcom F4 / 83 West — During recent space shot, ABC Houston noted feeding on TR11, NASA feeding TR23.



Comstar D3 / 87 West — NBC continues to feed morning news, some evening programs TR1; ABC feeds mornings, noontime and evening schedule through close down; TR13. CBS feeds morning news, promotions and evenings news, TR17. Video testing TR8.

Westar W3 / 91 West — ABC News Atlanta on TR3 feeds, Good Morning America Weather here mornings. CBS 60 Minutes fed TR17

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Sundays 7PM ET. Various morning show remotes now seen TRs 21, 23.

Comstar D2-1 / 95 West — Transponder 20 in use for occasional feeds to Puerto Rico.

Westar W4 / 99 West — TR2 WULATOC; TRs 4 and 5, sports feeds; TR6 Mexico City's XEW; TR11, ITNA New York; TR15 PBS, schedule 'A'; TR16 SIN; TR17 PBS, schedule 'B'; TR18 FNN daytimes, SelectTV evenings; TR19 Wold / LA including some ABC contract programming; TR21 PBS, schedule 'C' (cut back substantially due to budget problems); TR22 SPN; TR23 PBS, schedule 'D' and occasional feeds; TR24 GalaVision.

Westar W5 / 123 West — TR1 occasional video feeds including sports; TR3 WOR; TR7 CBS Cable; TR8 SNC Ohio and New England regional feeds; TR11 SNC (Satellite News Channels); TR15 ABC News London noted sending full, unedited feeds to NYC; TR16 Rocky Mountain / Inter-mountain SNC regional feeds. TR24 — BET was scheduled to start here mid-August with 8 hour per day schedule.

Satcom F1 / 135 West — TR1 Wold / LA and CBS Hollywood; TR3 video testing; TR8 AFRTS feeds to Alaska continue on irregular schedule, CBS 60 Minutes 7PM ET Sundays.

In another report, SPN (TR22, W4) has been noted testing an audio service using their previously unused 6.2 aural sub-carrier.

CONTINUED / from page 3

the very edge of being outside everyone's footprint, half a dB can be a bunch!

"That expanded-metal surfacing on the 'old' Hero is costing you quite a bit" he remarked on another morning. Touring the antenna farm with Humphries, in the morning, was a little bit like having your term paper graded while you sat there.

I responded that I knew that, and so did Bob Behar. Tay Howard had, in fact, made a suggestion to Bob Behar nearly a year ago. The suggestion resulted in Bob changing his surfacing material to an

entirely new screening material. Taylor told me that I could expect to gain between 1.5 and 2.0 dB on the older style Hero 'just by re-surfacing' the dish with the new screening. That's a project scheduled for early attention here since 1.5 to 2.0 dB is a lot of additional signal anywhere!

The new Hero Super-Tenna system is just about the most elaborate package available in the home TVRO industry today. That is probably part of the reason why Hero antennas have gone into some of the largest broadcast station systems in the USA; they are very competitive in performance, and price, with the so-called 'professional' class systems being peddled by SA, Harris et al.

And, for a brief 48 hours or so, our new Hero installation had certain refinements on it which no other polar mounted, frequency and transponder format agile, horizon to horizon motor driven six meter terminal in the world had. Let's see what this is all about.

Transportation

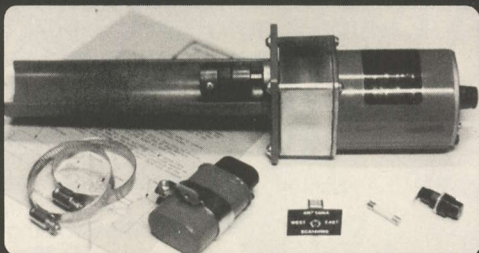
A six meter (just under 20 foot) antenna is big. There were 14 containers for the full system, weighing in at about 1500 pounds. The square-tube mount is certainly the most difficult, and expensive, part to ship. Four very strong men can barely lift and support it, and in the belly of a DC6, it has both weight and 'cube' (i.e. space consumed) against it. We paid nearly \$900 in air freight to bring the antenna system over 650 miles. Shipping it by boat would have cost us closer to \$400.

Assembly

It took two men who have now assembled three of the Hero dishes (all on our island, I might add) as follows:

- 1) **Hole** — we dug an 8 foot by 8 foot by 3 foot hole in the sand and coral. We re-enforced the hole with 3/4" steel rebar, building a cage, and mixed in a small Sears mixer the concrete for the hole. That took two days; one to dig the hole by hand, another to mix and pour the concrete.
- 2) **Base** — Hero supplies large 'hot-shot' anchor bolts which you install by pouring the pad, and then drilling into the pad with a concrete bit the required depth and diameter. The hot-shots expand to fill the hole as you drive them into place, and the top

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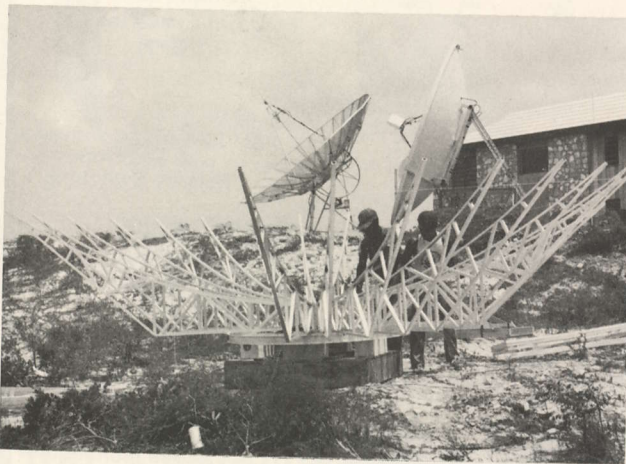
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end is threaded for 3/4" nuts. We chose **not** to use them, but opted to weld some 3/4" all-thread rod onto the 3/4" rebar steel in the hole. Then Hero provides an 'x' shaped steel channel that they typically rest on top of the pad. To this the actual pedestal mount bolts. We chose to drop the 'x' shaped steel channel support down slightly **into** the concrete. Hero now slots rather than drills the holes on the bottom of the pedestal mount, and that gives you over 20 degrees of mount rotation, on its own axis, in case you screw up and fail to get the 'x' piece squarely on a corrected north by south line. Remember, with a polar mount, there are sections of the mount which **must** be true north by south, or the antenna will not track accurately across the full satellite belt. Getting all of this together, in our admittedly custom configuration, took another half day.



- 3) **Hub to Rib Assembly** — There are 30 ribs on the present six meter model. They are factory assembled and it is up to you to mount them to the center flat-plated hub. That took us half a day.
- 4) **Rib-End to Rib-End Ties** — the outside perimeter of the antenna is held together with aluminum angle (the entire antenna is aluminum now) and you have to drill holes through the end pieces to tie each rib end to the adjacent rib end. That took less than half a day, including setting the four-support LNA and feed mount into position, and tightening it down.

By now, starting with bare sand and coral, we were about 3.5 days into the project. And we were ready to begin screening of the antenna.

- 5) **Surfacing** — Hero provides the surface panels pre-cut. One panel section laps from the edge of one rib to the opposite edge



SURFACING / presented no special problems but required nearly a full day of careful work to insure taunt-surface-structure.

of the adjacent rib. You use a hand drill to drill 4 to 6 inch interval holes in the top of the rib to accept a sheet metal screw. We used an additional hand drill fitted with a nut driver to run the sheet metal screws down tight. This process took one day because Peter and Val worked very carefully (they wanted the surface to be perfect, having some difficulty with the older Hero surface not holding taunt; a problem which the new mesh surface largely corrects), and because they put in twice as many sheet metal screws as the instructions called for.

- 6) **Hanging The Motor** — Here continues to use a half moon or half circle chain and guide which is driven by a small electric motor. Actually, the new antennas cleverly utilize a heavy duty motor that many Hams will recognize, in place of the big, current-hungry 120 volt operated 1/4 HP motors which the older antennas used. Installing the chain drive and motor

CONTINUED / page 56

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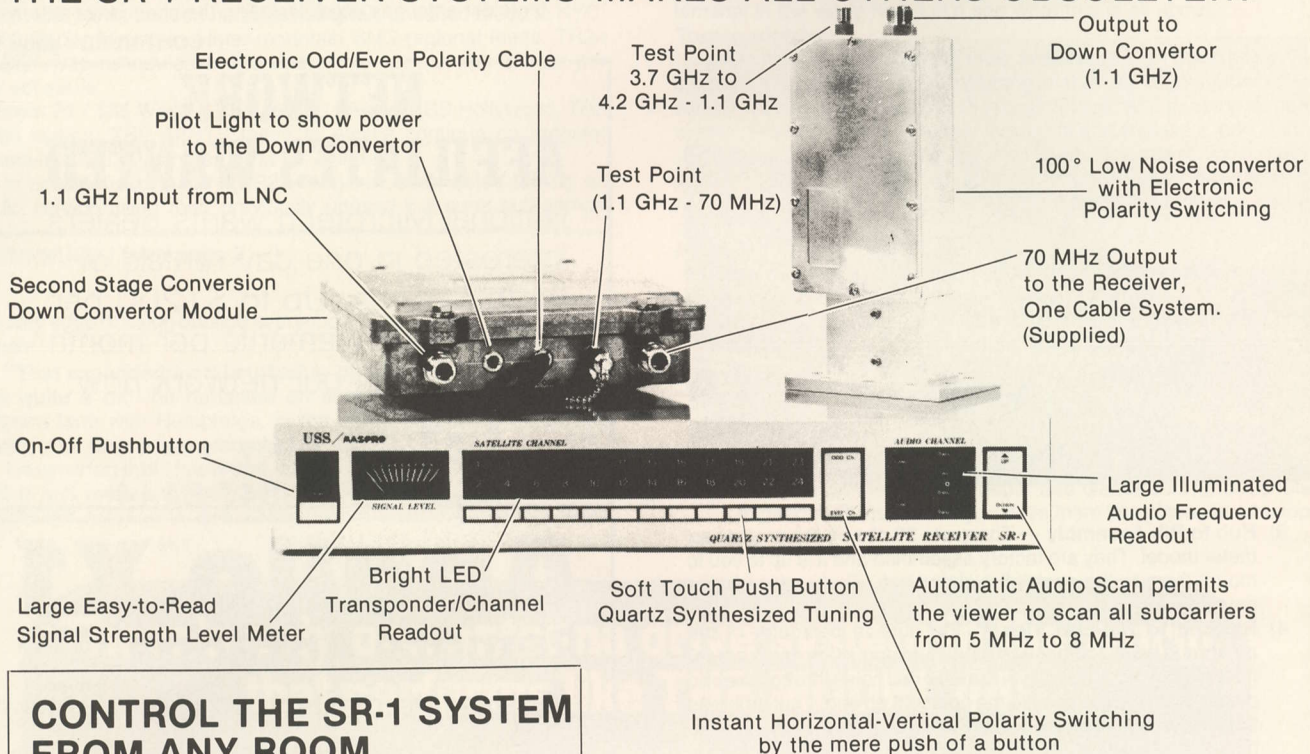
1 unit	\$59
5 units	\$49
10 units	\$42
100 units	\$35



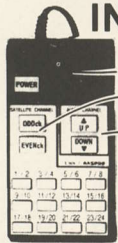
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DRAKE ESR-24

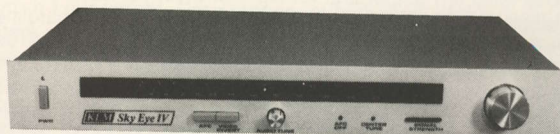
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took a couple of hours.

And now we were ready to lift the antenna onto the pedestal mount. Hero's new instruction book gives you three options to get the antenna up on the mount. We first considered 'walking' it up with a wooden scaffold. But it would have taken us at least a day to build a scaffold, and since we can now rent a small crane down here for less than the man-hours in wages involved with building a scaffold, we 'cheated' and brought in a crane. The crane was here for an hour and everything fit together perfectly. We understand some people have had difficulty getting some of the mount to pedestal holes to align; we did not, but we had been pre-warned and we checked it on the ground before getting the crane on site.

Those who are accustomed to walking onto a site with a nine or ten footer and waltzing out five hours later with perfect pictures on the screen are probably wondering what kind of lunacy has us nearly five days into the project, and still no pictures! The answer should be obvious; you don't wander off the beaten path and into weak signal areas with nine or ten footers that pop together.

Hook Up

Early Hero antennas required that you run an LNA power-line, a four conductor rotor line, a heavy 110 VAC line (good to at least ten amps) and an eight wire control cable for the remote control motor drive box. Plus, of course, either hardline or 59 to get the signal back inside. A special mention has to be made of the very neat, well engineered way Hero has thought out the control and powering and signal cables for the current generation package. There are pre-made cables that simply plug into a master control box that hangs up on the pedestal post. The LNA powering and rotor cable come down from the feed and plug into the box; the AVCOM receiver down converter plugs in as do all cables coming from the control location. You run the package of cables, already bundled, cut to length and with appropriate plugs on the end, to the master control box and plug them in. This not only saves time, it also reduces the chance of mis-marking or mistaking cables for something they are not. It also provides a way to check the dish operation, and do alignment, **at the pedestal proper**. Hooking it up took about as long to do as it took you to read this segment.

Alignment

With any polar mount, the appropriate side of the mount has to face true and corrected north by south, if the polar mount is going to track. And, you have a 'declination offset' adjustment to make as well.

Hero had made final tweeking of the north by south alignment very simple by slotting the four bolt holes where the pedestal attaches to the on-top-of, or, imbedded-in, steel frame that goes down into the concrete pad. The declination adjustment has a pair of rear-offset 3/4" all-thread rods which you crank up to the appropriate (a few degrees typically) reading, tilting the back of the dish frame higher than the front of the dish frame.

Tom Humphries had used our transit to make sure Val and Peter dug the hole with true (i.e. magnetic corrected) north by south sides, on two sides. Tom cheated; he used the 1981 installed SatFinder to 'extend' its north by south line across the new Hero pad. Since the SatFinder tracks perfectly from horizon to horizon, he figured that was as close to north by south as we were going to get. Later, when we got the new 6 meter tweeked, we would find he was dead on. It's nice to know that the magnetic declination hadn't changed in one year. That's one way to check that our earth is not 'wobbling'!

Bob Behar was on-site before we got ready to test it (he always plans it that way) and he got the honor of turning it on. Peter wanted to know, the day before, "**When are we going to go looking for people . . .**" with the big, new dish. Bob found 'people' within sixty seconds of turning on the electronics. That's no record for us (we turned on, dead-on Ghorizont, in 1981 and in mid-July Tom and I turned on an ADM 11 footer for a close friend, here on Provo, and not only had 'people' on one bird but full belt tracking from F4 to F3R within ten seconds of

turn on!), but it was darned good for a six meter terminal. The essence here is that if you understand how the geostationary belt works, and have your inclinometer handy, you can turn onto 'people' without much hassle. And a big six meter dish should be no more 'frightening' than a smaller dish.

For new comers to the industry, antennas get harder and harder to align, precisely, when they get larger. Why? Well, the larger an antenna, the greater its gain. And the higher the gain (and the larger the dish), the more 'compact' or 'sharper' the antenna 'pattern'. That simply means that you have to get **closer to** a satellite to see it, with a larger dish. And that in turn means there is less chance for sloppy error to produce results.

There are two tools you have to have; a good quality compass, so you can find 'true' north (**not** the same as magne-



ROTATING SECTION OF MOUNT / presents more of a 'lift' problem than does the antenna itself. They both weigh about the same. We borrowed a front-end loader to lift it into place.

tic north for most of us; see **Coop's Satellite Operations Manual**, from STTI), and, a good quality inclinometer. The latter allows you to set the elevation, or 'tilt' of the dish so that it points at (and tracks) the geostationary (Clarke) orbit belt as you rotate the dish east and west (azimuth). Given these tools, knowledge of how to use them, and the appropriate elevation from your location to the geostationary (Clarke) orbit belt, you **have to see** results.

Now the 1981 version of the Hero did have some problems 'tracking the full belt'. We have never really gotten it 'perfect', inspite of many attempts. It is still 'off' from about D3 westward to F2. There are those who would tell us that we have never gotten north by south, **plus**, declination offset exactly right. Whatever the failure, it is not for lack of trying.

This time around we went strictly by the Hero computer readout. The computer told us how much to offset the declina-

tion, and we did this. Then we tried tracking from F1 eastward to Ghorizont. At our location, that gets us from 14 west to 135 west, which pushes the horizon on both ends. The birds fledged by and the new Hero dish tracked flawlessly. Well, almost. Later when we went back to check Ghorizont, the bird's signal had dropped from a CNR in the 12 dB region to one closer to 5 dB. Clearly, something had changed. The answer was that Ghorizont, which flies in a 'figure 8 pattern' over the equator, had moved north (or south) of the equator, and it was looping back towards the equator on the second check. The Russians do this (as do many of the older Intelsat 4A and some of the 4B birds, as well as Symphonie) with predictable regularity. It will cause you some concern however when you first notice it! You may even be convinced your dish has lost its polar tracking accuracy at the eastern end.



SETTING THE DISH / on the post mount was far simpler this year; we used a small crane. Hero suggests three methods of getting the dish 'up', including building a scaffold to walk it up. Most will do it that way, and if you can get the height, the 300 or so pound structure is not that difficult to move to the top of the post.

Controls

The Hero package uses a remote controlled dish controller designed by Vector (Systems) for Hero. It gives you up to 99 possible satellite positions to pre-program into the box, and then gives you instant recall and on command, instant dish movement to any of those 99 locations. That's pretty neat, and even from our exceptional location, we could only 'load' 22 satellite locations into the box. Ninety nine is clearly overkill, even for 2 degrees satellite spacing (if it ever comes).

The Vector control box is not faultfree. At least ours is not. You first start the western end of the belt (i.e. F1) and manually push buttons working your way east from bird to bird. Each time you locate a bird (by placing the receiver in a scan-tune mode or rapidly flipping the transponder selection switch while the dish is moving), you stop and peak

up the signal with the east and west push button controls. Then you push a 'memory store' button, along with a satellite identification number (such as 01 for F1, 02 for F3R and so on). Anytime you go back to F1 after having told the box to memorize a location, you simply punch up 01 (or whatever) on the front panel keyboard, and then push a second button that tells the dish to go to that memorized location.

There is a bunch of circuitry inside of the Vector control box and some of it "glitches" without warning. To keep you from pushing 01 and the box then telling the dish to go to 08, you have a 'confidence' button you can push; memory recall. Pushing first the satellite number, then memory recall, displays on the front panel the 4 digit location numbers that correspond to what the memory says goes with the satellite selected. 1 on ours, for example is 0074 while Ghorizont is 6874. If I push 01 and then memory recall, and the numbers say 6074, I know that there is a glitch. If I happened to then push the satellite location button, the antenna will move not to F1 at the far western side, but to the far eastern sky in the near-region of Ghorizont.

I'm not sure how often the box 'glitches' but it is often enough that I always push memory recall after selecting a satellite, just to check the recalled-from-memory number displayed against the type written chart I have taped to the front of the control panel. Truthfully, it may glitch once in 100 uses. Correcting a 'glitched memory' takes about 30 seconds or so.

Hero has built into the current system a number of safeguards which I appreciate. For example, at both ends of the chain rotation there are electro-mechanical 'stops' built in. You cannot run the dish control, or drive motor, to the end of the chain, or into something. The stops shut down the motor drive before you can get into trouble. Kevin found that useful one night when he went for the ABC network service on D3, forgot to use memory recall to check himself, and the dish headed east. It finally stopped, automatically, when it came up against the stop sensor. We have run our older Hero against both ends more than once and feared that we would snap the drive chain, burn out the motor, or run the dish into the frame. **You cannot do this** with the current version, and that is good.

There is also a temperature sensor built into the rotation motor. We used the dish back and forth solid for an hour once, and it shut down. After a decent wait of ten minutes or so the motor, which was obviously getting warm, cooled down and the thermo-protection circuit let us use it again. Another nice touch since not everyone is conscious of such things, and cannot be expected to be moderate with the system when things are 'hot' on the birds.

Summary

The Hero Six Meter antenna produced from 1.5 to 2 dB more gain than our 1981 installed Hero six meter antenna. Why? Well, there is a far better mesh surface now, and the tracking mechanism is now flawless from horizon to horizon. The motor drive is cleaned up and only a few occasional glitches in the Vector control system mar an otherwise perfect performance. The dish goes together smoothly, the instruction manual is helpful (if not yet perfect) and the surface is excellent. So much for the review. Separately, let's look at what having a 'high efficiency' six meter, horizon to horizon, antenna with the most modern electronics in the world did for us.

LOTS OF SPANISH

I guess the most impressive thing about having access to Intelsat is the wide variety of South American programming **now available** on the birds. I do not speak Spanish (Bob Behar still gets excited and drops without realizing it into his native tongue, around me), nor Portuguese. But I am learning. Brazil, for example, now has not one, but two Rede Globo feeds on Intelsats. They are 525 line (you can leave your vertical hold more or less alone), but at a 50 hertz rate. They use PAL-M for color so on an American set they are in black and white. Both are half transponder format, with typically 5.8 (Portuguese) audio. They are not perfect by any means on a six meter dish, even equipped with 'goodies', but they are very viewable. Argentina is a new service on Intelsat and because it is on a 5A bird the signal is at least 3 dB hotter than an older 4A or 4B bird would be. I have been told that this is on a Global pattern, which would mean no better than +22 dBw. I find that difficult to accept since the signal is fully out of the

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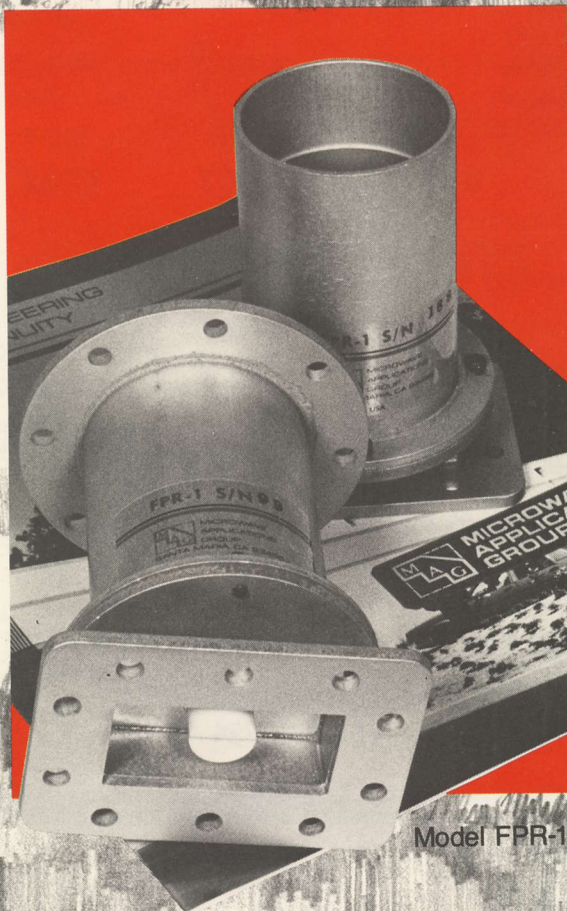
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noise, even if it is PAL-N (not M, but N) and 625 line. I enjoy Argentine television because I understand just enough Spanish to be dangerous, and, because they play alot of specials which I haven't seen on US TV. They shop the American and European TV marketplace, and their 18 hour per day service is quite excellent. Having no sparklies also helps me enjoy it. I love their newscasts since they make me feel I am getting **both** sides of the recent Falklands/Malvinas conflict. Whether they are Global (Steve Birkill sees them in the UK, suggesting they may be Global) or hemispheric matters little in the western hemisphere; they are **THAT** strong here, second only to Ghorizont.

Colombia is now transmitting 525 line, NTSC color, programming on Intelsat. I was surprised to see what good production values they have, expecting to see 1950'ish production quality. Not so; they have decent stuff. There is a problem, however. There is no audio(!). Those clever Colombians have come on late enough that they have moved to the next plateau of audio transmission technology; 'Sound In Syncs' as Birkill calls it. That means that they are using a system similar to the approach the Russians first used (and still use) with the inclined orbit Molniya birds. The audio is hidden in the sync pulses (see **Coop's Operational Manual** from STTI). Fortunately, I had a Birkill built Sound In Syncs decoder, and it took me only a little while to get it running. Several people, Birkill included, are now offering 'Sound In Syncs' decoder boxes, if you find you need such a gadget.

Then there are the occasional Spain feeds, somehow transmitted by accident or on purpose on Global beam which come through with enjoyable levels. These are not the Spain to Canary Island feeds that people east of the Intelsats see on eastern hemispheric beam, but special feeds headed to South America. If you speak Spanish, or speak Spanish and can follow Portuguese, you have seven channels available to you from Intelsat alone, virtually anyplace in the Caribbean or South America. The 'extra' slop from SIN and GalaVision just adds three more.

If you are counting, you are wondering where I got the extra two. I have saved this for last because it is really fascinating. Now Mexico made a deal with Intelsat to lease most of a full (older 4B) bird. They moved the bird to 53 west, as previously reported (and reported) in **CSD**, and on that bird are three channels, about 18 hours per day, at the present time. US receivers will find these channels at transponders 1, 5, and 7 on the dial and since these are reportedly hemispheric beams, you can actually find this bird as far west as northern California. Take your dish **east of W1** at 79 west, and you'll see what I mean.

Transponder dial positions 1 and 5 are from Mexico; they are NOT the same feeds you see on Westar 4. These are networks other-than XEW, the Cadena network that one finds on W4. One of the two is the Mexican educational network, the second is the XEW competitor that originates at XHGC on channel 4 in DF. It is the third channel, transponder 7 on your dial, that fascinates me.

The first time I saw San Diego television on transponder 7, at 53 west, I figured somebody was playing. I instantly wondered how they were getting uplink to a bird at 53 west **from San Diego** since the look angle to 53 west is very close to 5 degrees at San Diego. I did some checking, and found that Intelsat specs call for an uplink to work **down to 5 degrees** look angles, but I was still not convinced.

What they are doing on transponder 7 from 53 west is bicycling the three San Diego network stations (ABC, CBS and NBC) to fill an 18 to 20 hour day. It is in full transponder format so if you have sufficient signal, the quality is superb. Now you may be asking yourself why would anyone be paying good money to send a mixture of daily US (San Diego) programming, via Intelsat, on a bird dedicated to Mexico? I am not sure we will ever really know the answer but I checked with some people at Hughes, and some more in Mexico, and here is how I believe the pieces fit.

Recently the US FCC approved Mexico using US satellites to send programs not only **into the US from Mexico** (as on W4), but also from the **US back into Mexico**. That means that XEW and SIN can now exchange programs, back and forth, on Westar. Ho-hum; if you speak English and no Spanish.

However, the same agreement also gave the XEW/Cadena folks the right (from the US government, at least) to export US **network** programs to Mexico. Now the XEW/Cadena folks are possibly the most powerful broadcasters in the world today, not in government hands. It has been said that XEW pretty much runs Mexico. They certainly do have a bunch of clout.

XEW/Cadena has their corporate fingers in many things, including the rapidly developing MATV fed-by-satellite market, in Mexico. What they needed, to keep their international skirts clean, was a feed of US programming, for their MATV systems. Through their 'exchange program' with SIN, they slipped in a paragraph allowing them to export a single San Diego feed, to Mexico, via Intelsat. They sit at the unnamed uplink, and program by program decide whether they will export San Diego's channel 8 or 10, or 39; the three network stations. You can guess how they are using this feed in Mexico. I can see it being piped into Condos and apartments and whatever, along with a few of the local Mexican stations. That gets them US network programs, which we all know are, for the moment, very scarce on US domestic birds.

I'm sure they selected San Diego over other 'border' stations (such as El Paso or Harlingen) because of the fairly close 'community identity' between San Diego and the Baja California region immediately to the south. In any event, this hand picked network of US programming offers yet another interesting opportunity for people anywhere in the Caribbean, and South America. How else could you expect to get 'Family Feud' into Bolivia or Trinidad. Not to speak of Three's Company!

A word about the signal service from this bird. In Miami, on Bob Behar's six meter I have seen almost perfect reception. On Bob's new 7.5 meter, the picture is better than perfect. I understand the Mexicans are using many six meter and eight meter terminals, which tells me that they are engineering for 26 dBw footprints. Here in the Turks and Caicos, I have **not seen** that kind of quality. Even on the new Hero 6 meter. That bothers me since it kind of suggests a spot beam configuration. Hughes assures me it is hemispheric, however, and if it is truly hemispheric then my less than perfect pictures are due to a problem I have here; not with the bird's coverage pattern. We'll know more about this shortly as people with terminals in South America proper have a look at this signal.

MEANWHILE ON GHORIZONT

There is also plenty of Spanish language programming on Ghorizont these days. It originates in, or is created for Cuba. That is not news; we first reported on Cuban use of Ghorizont one year ago. What

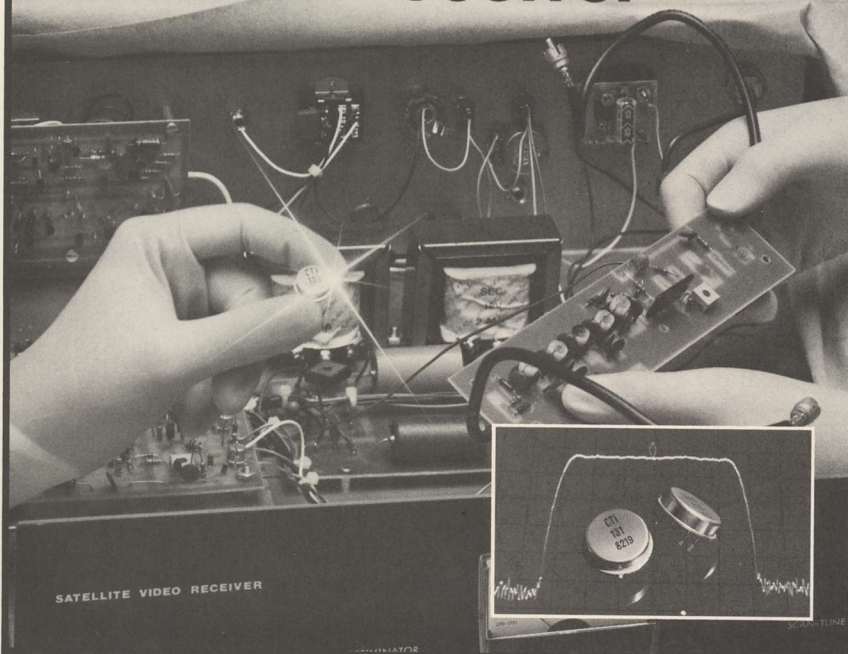
may be new, however, is the current heavy weekend use of Ghorizont's (US dial position) TR9 for a 30 hour plus feed of Havana television from Televisora Cuba; or, TVC. It starts at 8 PM (ET), Friday evenings and runs non-stop until past midnight on Saturdays, **most** weekends. On occasion they drop off the Cuban feed for some 'important' European stuff, but afterwards it gets back to a Cuban uplink again. Some of the programming is pretty fascinating. For example, you can watch US cartoons, in English, but dubbed (on screen; not audio) in Spanish. Then there are the movies. Heh-heh. Fidel is obviously very big with lifting US movies off the birds and taping them. Then he has them captioned (on screen by blanking about 8% of the screen at the bottom and dropping in the Spanish sub-titles), and we see it fed back to us, via Russian Ghorizont, in NTSC color. They have been on a Clint Eastwood binge of late, "Bronco Billy" and others only recently (or still) on US DOMSats pop up at 11 PM Fridays and throughout Saturday. The beauty of titling is that you can watch it in English, or Spanish.

The Cuban stuff aside, I suspect the evening I enjoy most on Ghorizont is Friday, although Saturday's 7 to 10 PM (ET) Cuban feeds are also fascinating. Starting around 5 PM (ET) they bring up some very non-Russian, English language programming. First they run an hour or so of pop music shorts; big name rock and country singers from the US, Blondie and Kiss and others of that ilk. These are the same type of shorts you see over on MTV, except the Russians have helped themselves only to the big name stars of the western rock world. MTV, as we all know, uses alot of trash because it is free.

Following an hour or so of this back-to-back rock music, they shift into 'Top Of The Pops' from the UK. This is similar to Solid Gold, except it is English and they somehow manage to grind through the Top 40 tunes of the week in an hour. Following this is catch as catch can time; more pop shorts, some segments lifted from West Germany featuring more American rock stars appearing in the Radio Bremen Musik Hall, and then they go for the big stuff. A Bruce Lee martial arts movie!

Steve Birkill reported on much of this in our June issue of **CSD**. Steve's point, and ours, is primarily 'WHY' is this stuff up there on

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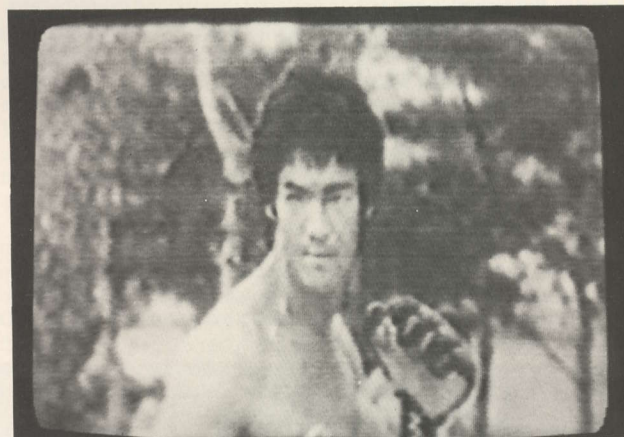
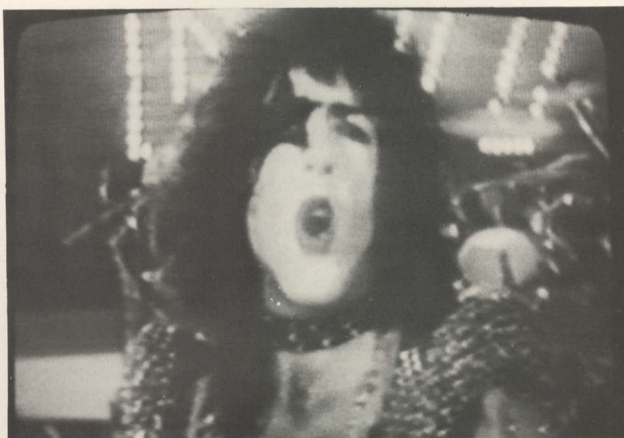
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Ghorizont, on what appears to be a regular schedule? At 5 PM ET it is past midnight in Moscow. That tells is the night shift is on duty at the Ghorizont uplink site in Dubna, north of Moscow.



Steve figured that the nightshift guys were running a loose ship and they had nobody peering over their shoulder, so they were shipping out things on Ghorizont which normally wouldn't grace a Russian TV screen. The rock and movies are, with the exception of 'Top Of The Pops', laced with badly varying amounts of tape head skew, tracking errors and multi-generation dub look. The editing between some of the segments is amateurish. We did some checking and found out that 'officially' there are no tape play back (or record) facilities at Dubna. This suggests that either they are working off a deck one of the nightshift staff brought in and jacked into the video and audio boards (the video runs hot sometimes, suggesting lack of even a proc amp), or, if Dubna is run so tight that nobody could sneak in a 1/2 inch deck and 'play', then that leaves us with the mysterious program block coming up to Dubna via the terrestrial microwave link that goes 150 Km south to Moscow. If this is the case, then the chances are that somebody is not playing, but is serious (and instructed) to run this stuff on Ghorizont on Friday nights (ET). I can see guys at Dubna, even Russian guys, chancing getting caught just **once** and sneaking some very-un-Russian programming on Ghorizont in the middle of the night, Moscow time. Part of the fun would be to do it and not get sent to Siberia. You only live once, right!

But when it comes up week after week, at the same time and in the same general format, that almost demands a top-down instructed schedule of some sort. And that brings us back to 'WHY' (?). I don't have an answer, just a bunch of theories. Those who are along the eastern seaboard of the USA, or virtually anyplace in Central, South America, Africa, Europe or the Indian Ocean region might tune in on transponder 9 starting around 2100 GMT (5 PM ET). There is something very un-Russian about the whole programming segment (many of the Radio Bremen Musik Hall numbers feature women who are topless, like the Solid Gold Dancers, but more so!), and while solving

this particular mystery has no priority at all, enjoying it while it lasts certainly beats watching Mister Rogers!

GHORIZONT Confusion

Back in our July issue of **CSD** we reported on the first-time-use of the Russian Ghorizont bird by television station WSOC in Charlotte, North Carolina. The article noted that WSOC one-upped local stations in the market by contracting directly with the Russians to bring back a feed reporting on the visit to Moscow of Dr. Billy Graham.

Our source for this report was Hero Communications, where we were shown a stack of Telex messages exchanged between WSOC and the Russian Ghorizont folks, and where we talked at length with Bob Behar about how the feed came off. What we did **not** do was contact WSOC since the time was very short in preparing the report (it was actually written to appear in the June issue and got bumped into July only by a quirk of fate). Perhaps we should have talked with WSOC. We have a pair of letters from people involved at WSOC, and they are dismayed that we did not give proper credit to the folks in Charlotte who made this historic feed work. I want to set the record straight.

The five meter terminal used for the reception of the feed was provided by a chap named Mike King who operates **Communications Unlimited**; an apt name for Mike's firm. The only Hero provided hardware was a special feed adapter which turned the Chaparral feed into a right hand circular (RHC) system.

Bruce Powers, a reporter for WSOC, advises that Dr. Graham did **not** appear in either of the two feeds (spread over two days, three days apart). Bruce notes that the good Doctor was sleeping soundly in his hotel when the feeds came off. The Russians did not allow WSOC to feed news tape during the feed, according to Powers. Our source at Dubna advises us that WSOC was prevented from feeding newstape because they elected not to use Russian provided taping gear and technicians, and there was no facility for them to feed tape from Moscow to Dubna using the NTSC format. Regardless of where the problem was, neither Doctor Graham nor newstape made it to WSOC on this feed. That everyone agrees upon.



WSOC NEWS ANCHOR Bill Walker, in Charlotte studios, asking a question via satellite-telephone of reporter Bruce Powers who is live in the studios of Soviet TV in Moscow.

Powers also wonders where the 'Gold Franc' pre-payment information came from. We noted the rates quoted were in French Gold Francs and that prepayment was requested. We assumed, apparently in error, that when the Russians **request** payment in advance, you pay in advance **or** you don't get use of their satellite. Powers says not so. "We did not receive a bill for weeks after the trip." Nice to know the Russians will extend credit to US television stations since we have been extending them grain export credits for years! The Telex messages did carefully recite all payment terms in Gold Francs, and we stand by that report.

Powers also takes exception to our report that it helps to speak Russian when setting up such a Ghorizont feed. Powers notes "... I

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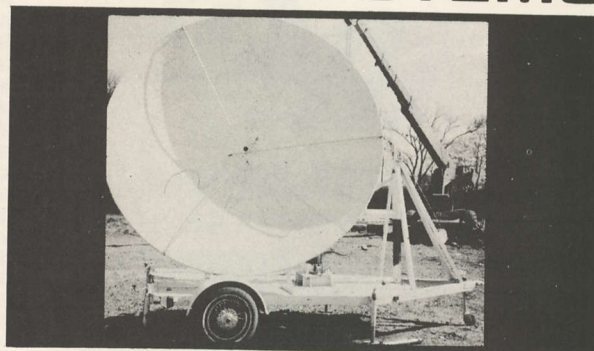
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worked closely with Valentine and Vitaly for the duration of the trip . . . and both men speak fluent English, as do some of the other people we dealt with at Soviet Television. The only important official that we had to communicate with at Soviet TV that (apparently) did not speak English was Lev Korolyou (v), but he always responded to our Telex messages in English through one of his interpreters".

As noted, we reported on what happened, as seen through Behar's eyes and ears. I think Bob Behar speaks good English but perhaps the Russians might not. I can understand an English speaking Russian person trying to understand what Cuban born Behar was saying, giving up and handing the telephone to an interpreter who speaks fluent English. Allowing for poor telephone connections, and Behar's accent, a Russian trained in formal English might have decided he needed help!

We appreciate Powers and Communications Unlimited's Mike King filling in the details on this feed, and if we incorrectly credited Behar or others with too big a part in this event, we will try to see that it does not happen again. Donsodonya (or however they spell it in Russia).

SMATV Tribulations

I'm not sure I share the enthusiasm many have for the seemingly unlimited market for SMATV (small, master antenna television systems). First of all, I think it is mis-named. If you set out to wire up a 1,000 or 2,000 unit apartment or condominium, it is hardly small and it is no longer a master antenna system. It is far closer to a SCATV or small cable television system. I note with some interest that the average cable firm that belongs to the independent cable operator association, CATA, has 1250 subscribers or so. MATV has always meant an inferior kind of cable television system, regardless of size; a hold over from the days when people stuck \$29 antennas on top of apartment buildings and looped 300 ohm flat line throughout the poor, hapless apartments below. MATV has **never** had the class of CATV.

The problem of properly naming SMATVs aside, we then have the legal problems. The idea is that you go into an apartment or condo complex, install a TVRO antenna, put in a decent cable distribution system and then proceed to sell the services you get off the bird (s), along with some local signals to round out the dial. That sounds so simple there must be a flaw someplace; right?

There is. The people who own the programming rights to the transponders on the various satellites won't sell you the right to resell their product. They are holding out for affiliation with the big cable systems which they figure will eventually wire up the same building you are trying to leapfrog into. Even if they don't have any real hope of affiliating with **the particular cable system** that may eventually cable up to the building you covet, the programmers feel they cannot afford to offend the big time cable operators by licensing competitors to cable (SMATV) to carry their programs. It only takes one guy mad at HBO, at TCI, to kick HBO off of perhaps 1.6 million cable drops. HBO can't afford that type of mad. So they and others have learned to simply say 'no' to SMATV folks who want to buy the product off of the birds, and resell it in an apartment or condo complex.

The refusal to deal has been the crux of the home terminal fight since we started SPACE back in February of 1980. **That refusal** got Scientific Atlanta to stop offering home terminals. **That refusal** killed a Gardiner Communications Corporation plan to offer home terminal systems **and** programming packaged together in 1979. The history of refusing to deal precedes this industry by one day, no matter how you figure this industry started.

So SMATV firms are really in a spot. They have this marvelous technology, and their tremendous abilities to liven up the TV screens for hundreds and thousands of condos and apartment complexes from coast to coast. What they don't have is a legal right to plug good looking and attractive programming into those systems.

A few SMATV firms have taken the law into their own hands and they simply steal the satellite product and sell the hardware to receive it. HBO et al say they are going to hang these guys by the tallest satellite tether, just as soon as they get the time to develop a solid legal case against them. Others have taken a different tact; they have taken HBO et al to court to try to force them to deal with them.

Out in Arizona, the Arizona Attorney General took Warner-Amex (The Movie Channel) and others to court charging that the satellite premium programmers were violating existing antitrust statutes. The

judge listened to the evidence being brought on behalf of the state of Arizona and decided there was no case. Warner-Amex et al never had to present a defense; the state case was **that** bad. Similar suits have been filed, by individual firms, as opposed to state Attorneys General, in several other states. I predict most will suffer similar fates.

Meanwhile, if that sets SMATV back a peg, a recent U.S. Supreme Court decision moves SMATV ahead a square. In a decision revolving around the rights of a building owner or landlord, the highest court has decided that if a building owner wants to **deny** a cable TV firm access to the building, to sell cable services, that is OK. In effect, it says that an SMATV firm is now free to convince the building owner that he should opt for his own SMATV system rather than be 'forced' to allow cable into the building so that tenants will have television program choice. Previously, it was suspected that cable had a 'right of entry', right along with telephone and electricity.

What this high court case really means is that the land owners now have the right to ask for big bucks in return for allowing the cable firms onto their property. Yes, they **can** deny them. But they can also 'change their minds' if they can reach a suitable dollar arrangement with the cable firms. Naturally the cable folks are angry about this since they usually slip into a building without paying anything to the building owner, or a very token fee at best.

SMATV folks will do well not to get too excited about the Supreme Court decision, as long as they have a more direct problem in making their services fly. Getting access to a building is only a small part of the problem; getting access to the programming to bring into the building, and sell, is a much bigger problem.

The **Wall Street Journal** and others have recently written that SMATV is a 'threat' to CATV, and that it may be the next boom business in communication. It might be, but it can only get there if it figures out how to get the programs. Cable TV was a great idea in the mid '60s and even in the mid '70s, for big cities. But it never got off the poles and into the homes because it had nothing in the wires but programs the hoped-for-subscribers already had available, free. SMATV is in the same boat. They have a great push cart with all of the modern gadgets attached. Unfortunately the push cart is virtually empty of product to sell, and without product it will shortly run out of gas.

MID NOVEMBER IN PROVO

Our cut-off deadline for notifying Carol Graba in our Fort Lauderdale office that you would like to attend a 'Satellite Retreat' on Provo in mid-November was this past August 25th. With this being prepared weeks ahead of then, there is no way I can tell you whether this will be a 'go' or 'no go' situation at this point. Those who did 'register' with Carol have by now heard of the decision, and they may also be receiving detailed instructions of what to do next about the time they read this. Tom Humphries, now a full time Provo resident, is convinced that we'll have a sell out but as I write this I am not so sure that we'll reach our 'go' quota of about 30 attendees. We jointly have a very busy fall season ahead of us. I expect shipment of a new 200 foot tower about the time you read this, to go at a new transmission site we are building in the middle of Providenciales. Our present 'Blue Mountain' site, served by a bank of solar cells and battery storage for full 24 hour operation, will give way to the new commercially powered location. The top of the new tower will be the tallest physical place in the whole country and it will house not only our channel 4 transmitting antennas but our new 'Channel X' service. No, 'X' does not stand for 'X-Rated'; not down here, anyhow! It does stand for a new type of premium service which we will be offering on top of our 24 hour standard broadcast service.

With some on-time-delivery-help from David Barker, the tower will also hold a wide-band FM link system to carry the basic WIV service some 38 miles away to the island of Middle Caicos where a new 'repeater site' will translate the link frequency and send us on again, via wide band FM, to the Grand Turk WIV transmitter. There we will demodulate the wideband FM and go directly into the WIV Grand Turk channel 4 standard NTSC transmission system. David is custom designing the full package for us and we hope it will be a reliable, low-cost answer to tying together points 70 to 80 miles apart, without the use of monstrous transmitter powers or high maintenance microwave gear. We'll see.

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Tom and I spent the two weeks immediately ahead of Omaha planning how he is going to carve up his own 2+ acres on the beach at Long Bay, and testing out both the new Channel 'X' transmission gear and a new low-cost ENG system. I am a sucker for cheap AM or FM transmission packages and I bought one that has ten watts peak video output power that runs off of 12 VDC with a standard NTSC output. It operates (at our request) in the UHF TV band (not used here for anything), and with this two pound package we can plug in a color camera and microphone, throw up a small yagi antenna and put (we hope) reasonably good quality ENG signals back to the WIV control room. If this one pans out, we'll tell you how you can get this same type of system for under \$1,000. If it does not work, I blew it again.

Since all of our production gear is in the studio or control room, there is no way we can go out into the field and bring back even a reasonably airable product on tape. We do it, but for every five minutes we air we spend a couple of hours shooting it, and then editing it in the studio. People will overlook almost anything when they know it is live, so if we can get video and audio over five to ten miles of flat island and open sea, and patch directly into the transmitter for live airing, I know we will make frequent use of the system.

WESTAR V OBSERVATIONS

There is an air of disappointment surrounding the early results reported for the latest Western Union satellite; number 5. I'm sure there will be individual locations that will report to the contrary, but from what we have been able to glean as we head to press, the Westar V signal levels are **not** up to the Westar IV signal levels, virtually anyplace. That is a difficult one to explain since the birds are virtually identical and if anything the off-to-the-side V orbit spot should have helped it have a beefier signal into the eastern and southeastern USA areas. Reporters in Wyoming and Texas also report the Westar V signals are lower than those from Westar IV, and we have noticed that the vertically polarized signals, while still stronger than those that are horizontal, are not nearly as **much** stronger as are those on Westar IV.

With Westar V tagged as the Western Union cable bird entry in the race with RCA Satcom family birds, it would be a shame if the new Westar at 123 west proved to be having some sort of antenna pattern problem. Western Union and the folks at Westinghouse are counting on this bird to bring in big bucks, and if there is a problem, they will have a more difficult path ahead of them. As always, specific reports from readers are solicited and will be digested and re-reported here.

DIRECTORY

Spread over the WIV television studio, in dozens of nice little piles, are hundreds and hundreds of CSD Directory Questionnaire forms. And each new mail bag delivery from the Fort Lauderdale office brings a new batch. Some people have no respect for deadlines!

I had originally intended to put together our 1982 industry directory for our September issue, and to have proofing copy of the 'copy' back to manufacturers, distributors and dealers around 1 July. As we passed the mid June deadline for the returning of forms, and they continued to 'rain in,' it became apparent that it would be foolish to try to rush out the first Directory and miss so many of the people in the industry. So I set my own, quiet, later deadline (mid-August) and decided to make this our year end issue; December to be exact.

In this way I can do a better job of including everyone, and we will also be at the end of the 1982 selling season. For those who are 1982-new to this business, selling home terminals goes down hill rapidly around the 1st of December for most dealers and distributors, and manufacturers start to look towards the 1983 season with an eye towards new products. We can also make last minute adjustments in listings up through and hopefully including the Rick Schneringer STTI show in Atlanta in late October.

So if you have been wondering where your proofing copy is, wonder no longer. It is in raw text form in the WIV TV studio and if we don't have any bad hurricanes down here this season the piles will slowly grow into text and then into typeset copy. When that is accomplished, we'll be getting you your own proofing copy to look over about the middle of October or so.

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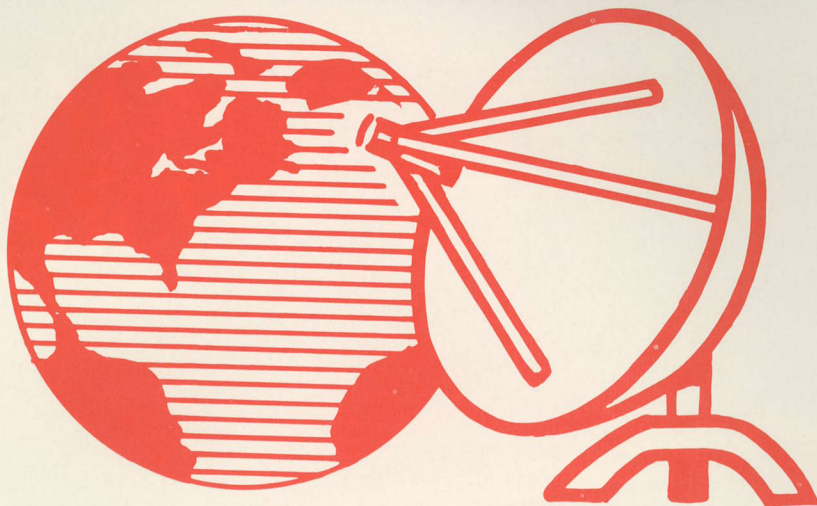
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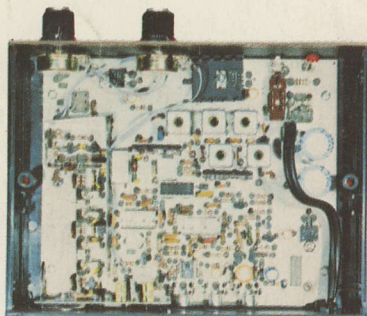
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